THE

VETERINARY JOURNAL

MAY, 1909.

Editorials.

THE ROYAL COLLEGE OF VETERINARY SURGEONS.

AT the Quarterly Meeting of the Council of the Royal College of Veterinary Surgeons held in April, the much-debated proposed Bill was again one of the principal matters brought forward for discussion. It has been stated, apparently in the tone of complaint, that the Bill has almost become a "pure money Bill," owing to the deletion of certain classes referring to unqualified persons as the result of agitation in various quarters. The main object of the Bill throughout has been to institute the payment of an annual fee, and it is not a source of much anxiety that it should remain so. The necessity for it allows of no argument, since the Treasurer's account for the quarter shows a deficit of £111. That, however, should not be taken too seriously, for it is the only quarter of the year in which there are no examinations, and consequently, although expenses are running on, there is practically no income, and a deficit is inevitable. We were glad to see that our suggestion for a quinquennially fixed fee of a guinea or half a guinea was brought forward, and supported by exactly one-half of the members voting, and was only lost by the casting vote of the President. We are sorry to think that the President here lost a very excellent opportunity of proving his strength and consideration for the views of others. We do not think the Bill would have been weakened in the least, and the adoption of the amendment would have appeased many members of the profession whose financial abilities are of a very high order, and as long as it was found necessary the fee could have been maintained at the larger sum. It has been said that since the clause relating to unqualified

practitioners has been deleted, there is nothing to be gained by the qualified practitioner from the Bill, since quacks may still flourish. That is not our view, though we may point out that the deletion is the direct result of the agitation set up by those who are now loudest in their bewailings over its loss. We do not see really that much or any more legal power is required by the Royal College of Veterinary Surgeons to protect itself. We are of opinion that they have sufficient legal powers if they only had the funds to enforce them. As the Bill will provide that, by far the most important object will be attained.

Another very important item of discussion arose out of the report of the Registration Committee. A certain member of the Royal College of Veterinary Surgeons had been convicted of fraud, and sent to a term of imprisonment. The point of the discussion was as to whether his name should be crossed off the rolls. The Committee made no recommendation, although a minority thought strongly that further action should be taken, and that the member's name should be removed from the Register. We have no hesitation whatever in expressing the opinion that the name of any member convicted of fraud should be crossed off the rolls. But we just as confidently assert that the method of procedure adopted by the Royal College of Veterinary Surgeons in such cases requires drastic alteration before it can be considered worthy of the governing body of our important profession.

We affirm that justice in such cases would be met if a procedure somewhat like the following were adopted: If a member of the Royal College of Veterinary Surgeons be convicted of any misdemeanour by the law of the land, his name should automatically be struck off the Register, and should be informed of the fact. The person affected may then apply to the Council for his name to be restored. The Council should then grant a hearing to him, and after due consideration decide whether the name should be immediately restored to the Register, or whether application should be renewed in a specified time. In the particuler case in question there is little doubt that under such a system the name of the offender would have been restored to the Register at the last meeting, the Council could not have been accused of condoning such conduct, and the ends of justice would have been attained.

THE ARMY HORSE SUPPLY AND MR. HALDANE'S SCHEME.

WE wish to draw the attention of our readers to Mr. Haldane's scheme, which has been detailed by Colonel Chetwode in a letter to the *Eastern Daily Press*, and which we have reprinted elsewhere in this issue.

With the disappearance of many London 'bus horses, and the displacement of not a few others by motor-cars, the question of army horse supply has become a serious one. If an adequate supply of Dreadnoughts is a primary *sine quâ non* of our security, so also is a sufficient horse supply for our military efficiency. The price of one Dreadnought well applied would help considerably to improve horse supply. That £20,000 offer by an anonymous gentleman to help equine fruitfulness ought to have been snapped up, and another £20,000 put to it by the Treasury. Coming particularly to the conditions under which horses will be sent to farmers under Mr. Haldane's scheme: from the receiver's point of view it would seem desirable that he should know the age of the horse he is getting, and also that as good a safeguard as possible should be given him as to its soundness when he acquires it. The fact that these horses will be unusable for agricultural work will make the number of those who desire them rather limited. It would be enlightening also to know at what age a cavalry horse in "ordinary circumstances" may "be cast."

The chief matters requiring attention and of importance in any sound and effective scheme are: Finance, Horse supply, Organization (military and civil), Administration (military and civil). Horse-breeding is the first matter that requires attention, and that cannot be carried on to any adequate extent without money. We are informed that last year in France the sum of £300,000 was voted for horse-breeding, and in Germany £190,000.

The only inducement that can be effectively held out to private breeders is one of profit, and, even if State studs ever become established here, they must be run on scientific, businesslike, and profitable lines. Foreign buyers take away most of our best horses. If we wish to keep them in future, unless an "alien horse-buyers prohibition Act" or something of that sort is introduced, our Army authorities must be prepared to pay as much as foreign

buyers pay. The number of horses bred here is decreasing with alarming rapidity. An old proverb says, "It is no use shutting the stable door when the horse has gone." If it told us how to find the horse and get him back again into the stable, it would be more helpful at the present time. We wish Mr. Haldane's scheme every possible success.

General Articles.

ABDOMINAL HERNIA.

BY J. J. O'CONNOR, PROFESSOR OF SURGERY IN THE ROYAL VETERINARY COLLEGE OF IRELAND, DUBLIN.

ABDOMINAL hernia may be divided into two classes:—(1) External abdominal hernia or rupture, which is the passage of portion of the abdominal viscera, through a rupture or opening in the abdominal wall, to lie beneath the skin, which remains intact; (2) Internal abdominal hernia, which shows no external objective symptoms, *e.g.*, diaphragmatic hernia and "gut-tie." I will confine myself to the first class.

Every external abdominal hernia comprises a hernial ring and a hernial swelling.

Hernial Ring.—The hernial ring may be formed by a persistent prenatal opening, *e.g.*, the umbilicus; or a normal physiological opening, *e.g.*, the inguinal ring; or by a solution of continuity of the abdominal parieties. Its shape may be oval, circular, slit-like, or irregular. Its size varies, it may only admit the tip of the little finger, or all the fingers of one hand, or, in exceptional cases, something larger. Some herniæ have two orifices, or rings—one external the other internal, *e.g.*, inguinal hernia.

Hernial Swelling.—The hernial swelling consists of a hernial sac and hernial contents.

Hernial Sac.—The hernial sac is made up of skin, fibrous tissue, perhaps a few muscular fibres, and, in many cases, parietal peritoneum (umbilical and inguinal hernia, &c.), but in hernia due to traumatism the parietal peritoneum may also be ruptured, and thus not form part of the sac. Some authorities confine the term "sac" to peritoneal covering of the hernia. The lower part of the sac is sometimes called the base, and the part next the ring the neck.

Hernial Contents.—The hernial contents include the organ or organs which have passed through the ring into the sac, and a variable amount of fluid called hernial fluid, and the hernia may be named according to the nature of the contents, thus bowel in the sac constitutes enterocele, omentum-epiplocele, stomach-gastrocele, and uterus-hysterocele.

Reducible—Incarcerated—Strangulated.—If the contents can be pushed out of the sac into the abdominal cavity the hernia is reducible. If they cannot be returned owing to the contents being adherent to the sac, or to their being too large to pass through the ring, it is incar-

cerated or irreducible. If the contents are so tightly compressed by the hernial ring that it acts like a ligature, arresting the circulation of the blood and leading to stasis of the intestinal contents, the hernia is strangulated. Strangulation is brought about by such an increase in the volume of the hernial contents that the ring is not able to accommodate them. This may occur suddenly from a violent muscular effort, or from a fit of coughing, or it may be due to the loop of intestine in the sac becoming greatly distended, owing to the posterior end being occluded by getting kinked or twisted. It is not always the ring that causes the strangulation. In some cases, especially in inguinal hernia, it is caused by the neck of the lining of the sac.

Etiology.—Hernia is favoured by increase of the intra-abdominal pressure, as may be brought about by tympany, or violent contraction of the abdominal muscles, which tend to force the abdominal organs through the abdominal wall. If there be a weak spot in the abdominal parieties, resulting perhaps from a deep-seated abscess or deep wound, it is apt to give way before this force. Hence the severe straining of diarrhœa or parturition, and violent fits of coughing, may lead to a hernia. Violent impact of the abdominal wall against a blunt body often results in rupture of the abdominal muscles, while the skin, on account of its elasticity and mobility, suffers merely from contusion. Heredity may be cited as a predisposing cause. Inguinal and umbilical hernia may be congenital.

Symptoms.—The symptoms are local and functional. The chief local symptom is the presence in some part of the abdominal wall of a swelling varying in size from a grape to that of a man's head, or something larger. If it be enterocele, the swelling will be elastic on palpation, and pressure upon it will diminish its volume, or perhaps reduce it completely. One or more fingers may be passed into the inguinal ring so that its edges can be distinctly felt. During these manipulations gurgling or rumbling in the bowel may be heard, and its vermicular movement may be felt, and if it be tympanitic it will be sonorous on percussion. If the animal be made to exert himself or to cough, the swelling can be seen and felt to increase in size. If it be epiplocele, it will be doughy to the feel, and will of course reveal neither borborygmus nor tympany. The functional symptoms of reducible hernia are practically nil. There may be some digestive trouble and slight colic. Incarcerated hernia produces similar symptoms, except that it cannot be reduced and the ring cannot be so easily felt.

Strangulation is indicated by well-marked symptoms. The tumour increases in size, becomes, hard, tense, painful and irreducible. The animal evinces symptoms of severe and continuous abdominal pain, behaving as in a bad attack of colic, and having a tendency to lie on his back. In the dog, vomiting is a symptom. If the condition is not soon relieved the strangulated mass will become gangrenous, and death will occur in about twenty-four hours. Micro-organisms multiply in the herniated loop of intestine and pass through its mortified walls into the peritoneal cavity, whence they reach the general circulation and give rise to fatal septicæmia. Adhesions between the hernial sac and its contents result from inflammation. At first the adhesions are soft and fibrinous, later they become firm and fibrous. Sometimes they are uniformly distributed; other times they are in the

form of bands. The omentum is the most likely to become adherent. Adhesion prevents complete reduction of the hernia.

Diagnosis.—The diagnosis of a hernia can be easily made out from the foregoing symptoms. If there be any doubt in the matter it may be cleared up by exploratory puncture, with a fine trocar and canula. It may be confounded with an abscess, neoplasm, or cyst, but a person acquainted with these conditions is not likely to make a mistake.

Prognosis depends on the nature of the hernia. It is manifestly very grave when strangulated, but prompt and skilful treatment is likely to be successful. Irreducible is more serious than reducible hernia. The smaller the ring compared with the size of the swelling the greater the risk of strangulation, and small intestine is more easily strangulated than colön or omentum. Recent is more serious than old hernia, and intestinal is worse than omental. A large hernia may interfere with the animal's usefulness, and in all cases the hernial contents are more or less exposed to external injury. Hernia, especially umbilical and inguinal, may disappear within the first year of age, but seldom after this time. On the other hand the hernia may increase in size. Strangulation is more likely to occur in hardworking horses than in those doing light work; but a horse may have a hernia all his life without suffering any ill effects from it. Treatment consists in bringing about gradual diminution in the size of the sac, or in removing it and closing up the abdominal opening. The different methods of treatment will be dealt with in speaking of the different herniæ.

Umbilical Hernia.

Umbilical hernia, omphalocele, exomphalos may be congenital or acquired during the first few weeks after birth, as the result of straining from diarrhœa or constipation, or from the exertion of playing or gambolling. Viscera appearing in a dilatation of the umbilical cord without skin covering is a different and fatal condition seldom met with. The hernial contents may be either bowel (cæcum or colon), or omentum, or both. The symptoms are those of a hernia at the umbilicus, somewhat hemispherical in shape, and varying in the size of its swelling and ring as stated.

Prognosis.—Incarceration or strangulation seldom occurs, probably on account of the nature of the contents. It frequently disappears of its own accord within the first six or twelve months of age, as the result of the bowel becoming distended with solid food and the abdominal muscles developing and filling up the abdominal opening as the animal grows. Adhesion is rare. I believe it sometimes occurs in calves, and is complicated with diarrhœa, preventing thriving and often causing death.

Treatment.—When the animal is under one year old nature may be trusted to effect a cure of her own accord, or she may be assisted by the use of a truss, blister, or caustic agents, which are of little or no avail in older animals. A truss is a pad which presses against the hernial opening and retains the hernial contents in the abdomen until the opening closes. It is kept in position by a surcingle round the body. It is apt to get displaced or to cause chafing, and in some cases even necrosis of the skin. Sometimes the bowel comes back into the sac and gets pressed, and perhaps injured between the bandage and the

abdominal wall. Moreover, the animal may resent its use and fail to thrive from the irritation caused by it. It is not applicable to the pig or dog.

A blister applied to the hernial sac will cause a certain amount of inflammatory swelling, which will tend to push the contents into the abdomen, and the subsequent fibrous tissue formation and cicatrical contraction will help to reduce the size of the sac and that of the hernial orifice. The application of a caustic will cause an eschar and the same results as a blister, but to a more marked degree. Sulphuric acid 1 part to 3 parts of water applied daily for five to eight days has often been used with apparently good effect. Pure nitric acid or sulphuric acid applied in lines with a glass rod not more than twice is also recommended. The hair should be clipped short before applying these dressings. The action of the caustic must be carefully watched, for if used too often or rubbed in too much a too deep slough may occur, and be followed by prolapse of the bowel. Chromic acid, bichromate of potash, and the actual cautery may also be used. Some authorities combine bandaging with blistering, a method which, though more effective than either, alone is apt to cause chafing and great irritation.

Subcutaneous injection of 1 to 2 oz. of 15 per cent. common salt solution is another form of treatment which has results similar to the above, but it has been known to cause too severe sloughing. The injection of a few drops of a 10 per cent. silution of zinc chloride has, according to a Frenchman, Launelongue, given remarkably good results in the treatment of chronic hernia in man.

All the methods of treatment mentioned above are of doubtful benefit, and are not scientific. If a certain cure is required, it is better to proceed as in the treatment of older animals and adopt one of the following methods :—

(1) *Ligation of the Hernial Sac.*—Clip the hair from round the neck of the sac before casting the animal. Control him in the dorsal position by means of side lines or hobbles and a back strap. Chloroform is not necessary except the patient is given to violent struggling, which interferes with the reduction of hernia. Shave and wash with an antiseptic solution the site of the operation. Reduce the hernia, take up the empty sac, and apply a strong ligature tightly round its neck as close as possible to the abdominal wall. To prevent the ligature slipping, pass a couple of skewers or horse-shoe nails at right angles to each other below the ligature and turn down their points ; or the neck of the sac may, in the first instance, be transfixed with the skewers or the ligature applied above them. If the sac be too large for a single ligature, pass a needle threaded with the silk through the neck close to the ring, cut the thread close to the eye of the needle, and ligature the sac in sections. The important point is to make sure that the hernia is completely reduced before applying the ligature or passing the needle through the sac. The ligature must not be drawn too tightly for fear of causing too early sloughing of the sac. If reduction be difficult, taxis on the bowel per rectum may be practised, and if its return is prevented by tympany or distension with fluid, it may be tapped or aspirated. If adhesions are present the sac must be opened under aseptic precautions, and the adhesions separated with the finger or by careful dissection, but in such case suturing of the hernial ring

is generally performed. This is a very good method, and is extensively practised.

(2) *Use of Clams.*—The procedure here is the same as in the last case, only a clams is used instead of a ligature. It is applied very tightly to the neck of the sac, as close as possible to the abdominal wall, and parallel to its long axis. In the case where the umbilical opening is very close to the sheath, the clams may have to be placed crosswise to prevent its interfering with this structure, but it is not so secure in this position—it is more likely to be caught by something, or by the patient's foot or teeth, and torn off. It is an excellent method of treating ordinary hernia. Needles or horse-shoe nails may be used as above to prevent the clams slipping, or the clams may be attached to a surcingle fixed round the body, or it may be secured by a few sutures passed through the sac above and below the clams and tied round the latter. The clams may be made of wood or iron, preferably of the latter. The edges of the metal clams are serrated so as to give them a grip on the skin. There are different varieties of these iron clams. A common form is that whose two portions are brought together by a screw at either end. Another one has a screw at one end and a hinge at the other. It cannot be fitted so evenly as the first one. Mr. Allen has invented a spring clams, which I believe has many advantages. Desmesse and Dégive, of Belgium, advise the use of two wooden clams for large hernia, one applied above the other, the function of the lower one being to prevent the upper one slipping. Whether ligature or clams be used, the subsequent phenomena are the same. The animal may evince slight colic for some hours after the operation. On the following day inflammatory symptoms appear around the umbilicus, which becomes the seat of a hot œdementous swelling, and the sac becomes cold and purplish. There may be some inappetance and a couple of degrees of fever. Towards the fourth day the sac is dead. On about the twelfth or fifteenth day the ligature or clams and sac fall, leaving a more or less extensive wound, and considerable œdema of the abdominal wall, which gradually disappears. A depression is observable in the position of the umbilicus, but at the end of three or four weeks the wound is completely healed, and the umbilical opening is totally obliterated.

After-treatment.—After the operation the animal may be put in a loose box, or, if the season permits, on grass. He should be kept under observation, lest he might try to interfere with the clams. The sac and regions round the clams or ligature should be washed with antiseptic solution every day until the clams falls. This precaution is often omitted, without the patient suffering any ill effects.

Complications.—These methods have seldom any untoward results, although cases are recorded where the clams and sac came off, or were torn off by the animal, too soon, and prolapse of the bowel followed.

(3) *Suture of the Hernial Ring.*—I indicated in those cases where the sac has to be opened to reduce strangulation or to separate adhesions, or where one of the above methods has failed, and in all cases in the small animals, *i.e.*, the dog and cat. Done with proper aseptic and antiseptic precautions it is without danger. Keep the patient on laxative concentrated diet for a couple of days before the operation, and have him fasting on the morning of the operation. During this preparatory stage it is advisable to have the hair clipped from the

hernia sac and its immediate vicinity, and the region well washed, first with soap and water and afterwards with ether and an antiseptic. Cast and anæsthetize the patient, and fix him in the dorsal position. with the hind limbs kept down with a back strap. Apply cloths wrung out of an antiseptic round the feet to prevent dirt falling from them into the wound. Shave and wash with ether and antiseptic the site of operation, and damp the hind limbs and surrounding parts with the antiseptic to prevent dust contaminating the field of operation. Have your hands, instruments, and ligature sterilized, and, everything being ready, make an incision through the skin and fibrous covering of the sac parallel to the long axis of the body, isolate the delicate peritoneal lining of the sac from its other coats, reduce the hernia, seize this portion of the sac with an artery forceps, give it a few twists, and apply a silk ligature round its neck as high up as possible, amputate the sac below the ligature, return the stump into the abdomen, freshen the edges of the hernial ring by scraping them with a knife or snipping them with a scissors, then bring the edges together with strong interrupted silk sutures. Shorten the skin to the required length, and suture it. Dress the external sutures with collodion and iodoform. Get the patient up, and cover the wound with a pad and bandage, but this is not essential. Healing by first intention may occur, but it is not the rule. When the wound suppurates, some or all of the buried sutures will require to be removed.

If adhesions are present, the peritoneum must be perforated to permit of their separation. If the latter is impossible, the peritoneum may be cut round the adherent portion, which is then returned with the bowel. If it be omentum that is adherent, it may be excised after ligation. If there is strangulation, the peritoneal sac must also be opened and the stricture slightly incised to allow reduction. During the operation the fingers of the left hand must keep the abdominal organs out of the way. A very curved needle on a handle is the most suitable for suturing the ring.

I have performed a modification of the operation in a few cases with complete success. The modification was this. I dissected the skin from the fibrous and peritoneal layers of the sac, then made an opening in the sac sufficient to admit my finger, inserted suture through the edges of the ring, guiding the point of the needle with the left index finger into the abdomen, tied these sutures loosely with running knots, passed a double (Staffordshire) ligature through the neck of the sac, passing through the fibrous and peritoneal layers only, cut off the sac about half an inch from the ligature, and then took up each of the sutures and made them as tight as possible, aud then proceeded as described. This modification appears to me to make a more secure closure of the opening and to avoid the risk of peritoneal infection from placing a ligatured stump inside the abdominal wall, the ligature in this case being outside, with sutures in front and behind it. The wounds did not heal by first intention, and the ligature and some of the sutures had to be removed, otherwise the patients did splendidly.

(4) *Dégive's Method.*—Another method of treatment was introduced by Dégive in 1894, and he says it is superior to all other methods. In two cases where he had failed in the treatment of a very large hernia with the clams he got a complete cure by this method. I performed it recently on a large hernia, and it impressed me as being the simplest

and most effective of all methods for cases where the clams used in the ordinary way might not succeed, and where opening of the sac is necessary.

The case was in a three-year-old thoroughbred filly. The hernia was unusually large, four fingers could be passed through the ring longitudinally and transversly, it was irregularly cruciform in outline, and its edges were hard and nodular. Close in front of the ring there was a deep digital depression in the abdominal floor, almost making the ring double. Having taken the preliminary precautions already mentioned, I opened the sac at about its centre to an extent sufficient to admit the index-finger of the left hand. I then passed a stout, slightly curved needle, with a handle, through the lips of the anterior half of the ring, going through the skin, abdominal wall, and parietal peritoneum, and I guided it clear of the abdominal viscera by means of the left finger in the abdomen. Through the posterior part of the ring I passed another needle of the same kind. I then applied an iron

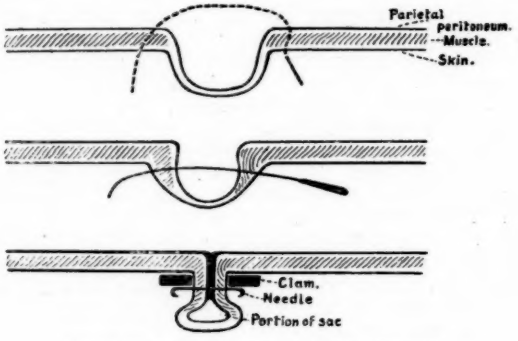

DIAGRAM ILLUSTRATING DÉGIVE'S METHOD.

FIG. 1 represents the hernia on vertical section in the standing position of the animal. The uppermost line represents the parietal peritoneum; the middle line the muscular wall of the abdomen; and the lower line the skin. The dotted line passing across the hernial ring represents the course of the needle.

FIG. 2.—The needle has been passed through the edges of the ring, turning them slightly downwards.

FIG. 3.—The clams have been applied and it has the effect of bringing the peritoneal surfaces into contact and turning the edges of the hernial orifices outwards. The hernial opening is thus completely occluded.

clams above the needle, and screwed the two parts of it together as firmly as possible by means of a pincers. This had the effect of turning the edges of the hernial ring outwards and bringing the serous surfaces into contact. When the clams were secured I withdrew the needles, and inserted instead of them four horseshoe nails, whose points I curved downwards, their function being to prevent the clams getting displaced. The patient showed a little colic for a short time after the operation, but after that she never looked back. The swelling was slight compared with other cases treated by other methods. The clams remained on for three weeks, and when it fell a level bare

surface was left about 3 in. or 4 in. in width. This space got smaller everyday afterwards, and eventually little or no scar will be left. Dégive advises in addition to the above to fix the clams round the body by a sort of a surcingle.

Inguinal and Scrotal Hernia.

Inguinal and scrotal hernia are practically the same thing. Scrotal hernia is merely an inguinal hernia extending into the scrotum. The term "bubonocele" means an inguinal hernia which does not extend beyond the external inguinal ring. "Osceocele" is the technical name for scrotal hernia. The condition is most common in horses and pigs, it is seldom seen in ruminants or dogs, but it is met with fairly often in bitches.

Ætiology—It may be congential or acquired soon after birth from causes mentioned for umbilical hernia. In adult animals it may be caused by the hind legs slipping outwards and backwards, thus dilating the inguinal canal; by heavy testicles which also tend to dilate the internal abdominal ring; and by too vigorous copulation, which has the same effect. Dragging on the cord during castration, or the use of heavy clams for this operation, may lead to it in the gelding. The sac of the hernia is formed by skin, dartos, and tunica vaginalis. The contents may be intestine, or omentum, or both.

Prognosis.—When congenital it may disappear spontaneously, as already indicated. Occurring suddenly in old stallions it is usually strangulated; when large it may interfere with usefulness.

Symptoms.—The swelling may be invisible—that is, it may not have come outside the external abdominal ring, or it may reach to the hocks. In chronic cases in stallions the testicles may be atrophied. The hernial swelling is usually to the inside and in front of the spermatic cord or testicle, and it is commonly situated at the level of the epididymus, but in scrotal hernia it may lie on the floor of the scrotum. An incomplete inguinal hernia, that is one confined to the inguinal canal, is difficult to detect. It may never be suspected until it becomes strangulated, and even then it may not be diagnosed. Rectal examination may reveal the bowel or omentum extending into the inguinal canal. Recent inguinal hernia generally causes stiffness in the gait, the hind limbs being turned outwards and the toes dragged, and the testicle of the affected side is often drawn up. There may be slight colic. These symptoms may pass off, or they may become intensified owing to strangulation taking place. The symptoms of strangulation have already been dealt with.

Diagnosis.—Diagnose it from sarcocele (a hard tumour of the testicle) and hydrocele (dropsy of the tunica vaginalis, which always occupies the floor of the scrotum, and can be displaced from one part of it to the other). In the gelding distinguish it from scirrhous cord.

Treatment of (1) *Reducible Inguinal Hernia.*—In foals and other young animals closure of the inner abdominal ring may he attempted by causing inflammation of the spermatic cord and consequent adhesion of it to the tunica vaginalis by vigorous rubbing of the skin at the level of the cord, or by tying a woollen cord above the scrotum and leaving it on for eight hours. Applying an irritant to the skin over the cord will have a similar effect. Cure may occur, however, in these animals without any treatment. Trusses are very difficult to adjust in the

inguinal region. In animals one year old and upwards the best treatment is to proceed as in the covert operation for castration. Fix the patient in the dorsal position, anæsthetize him, and after taking the usual precautions reduce the hernia, cut through the skin, and dartos without incising the tunica vaginalis, enucleate the latter as high up as possible, give the cord one or more complete twists so as to close the vaginal sac inside the canal, and apply clams round the cord outside the tunica vaginalis as close to the external abdominal ring as possible. When the clam is short it is more easily fitted high up, but then it may become so embedded in the tissue that it is difficult to remove. Möller uses a short curved clam, which he encloses in the wound by bringing the skin together over it with sutures. After five or six days he opens up the wound and removes the clams, and finds the wound granulating nicely with little or no pus. He also applies a triangular bandage. If the animal is a stallion the testicle is cut off about one half inch below the clams. A ligature may be used instead of a clam, but the latter is preferable. The ligature frequently gets septic leading to suppuration, which will not cease until it is removed, and its removal is often very difficult. The clam may be left on until it falls. If adhesions are present or suspected the tunica vaginalis must be opened to separate them or to explore the interior of the sac.

(2) *Strangulated Inguinal Hernia.*—It may be possible to reduce the hernia by scrotal taxis, that is, by manipulating the swelling and pressing upon it at the neck of the sac. This taxis may be mediate, that is, performed without opening the sac, or immediate, that is, after opening it. Care must be taken not to use violence in pressing upon the bowel for fear of injuring it, especially as it is in a weakened condition from being strangulated. It is more likely to be successful when the horse is on his back with the hind-quarters raised, and under the influence of an anæsthetic. Taxis per rectum alone, or associated with this, may bring about reduction. A little sterilized oil injected into the sac will act as a lubricant and facilitate reduction. It is, however, a mistake to lose much time by these methods; it is better to perform the radical operation at once, for the longer it is postponed and the more the bowel has been bruised the less is the chance of success. When it is done soon after the recurrence of the hernia, before the patient is exhausted, not later than twelve hours after the onset of the condition, it is very likely to be successful.

Radical Operation.—Prepare and take all precautions as usual. Anæsthetize the animal, and fix him as for the castration of a rig, with the hind limbs well flexed at the hocks and drawn outwards. Firstly, incise the skin and dartos throughout the length of the swelling from before backwards, and enucleate the swellings enclosed in the tunica vaginalis as high up as possible. In some cases the tunica vaginalis is found ruptured. Secondly, puncture the tunica vaginalis at the posterior aspect of the swelling, taking care not to injure its contents. Insert a director into this opening, pass it forward, and incise the tunica vaginalis upon it. Thirdly, pass the finger or hernia director into the sac to the outer side of the hernia contents until the point of stricture is cleared, then introduce a straight, blunt-pointed bistoury, or a herniotone, along the finger or director flatwise, and when it has reached just beyond the stricture turn its edge towards the latter and cut outwards and forwards so as to avoid the posterior

abdominal artery, which is to the inner side of the internal abdominal ring. In most cases it is sufficient to cut the neck of the sac (kelotomy). The incision of the stricture must be very limited. If it be made too large, some of the contents may pass through the opening thus made, and lead to false reduction. Fourthly, examine the bowel, and, if it is not necrosed, bathe it in warm ·7 per cent. saline solution, apply gentle pressure to it, trying to get the portion nearest the abdomen reduced first. Taxis *per rectum* may be used to facilitate reduction. Apply the force parallel to the direction of the canal. If there is a perforation of the bowel, it must be sutured by Lambert's method, and, if there be gangrene of the herniated mass, it must be resected. A simple way of dealing with omentum, whether gangrenous or not, is to amputate it after applying a ligature, if necessary. Lastly, apply a clam or ligature round the cord outside the tunica vaginalis as before, and remove the testicle.

To Preserve the Testicle.—Open into the tunica vaginalis outside, close to the external inguinal ring, pass the finger or director into the constricted part of the sac and cut it. Then reduce the hernia and suture the internal wound. This operation does not provide against recurrence of the hernia. After treatment, put the patient into a clean, well-ventilated loose-box, free from drafts, and give him soft, nutrient diet. Bathe the wound once or twice daily with an antiseptic solution.

Complications.—The chief complication to be feared is peritonitis, as the result of contamination during the operation, or of organisms passing through the almost dead walls of the herniated loop of intestine. Gangrene of the bowel may occur subsequent to the operation. If it be of the dry form, it may not occur for eight to ten days, the animal in the meantime appearing to be doing all right. Death may result from septicæmia, shock, or exhaustion.

False Inguinal Hernia.—Here the hernial contents are in the inguinal canal or scrotum, but outside the tunica vaginalis. The hernial ring is in front of the internal inguinal ring. It appears higher and closer to the abdominal ring than true inguinal hernia. Its sac is described by some as having the appearance of a peaked nightcap.

Treatment.—If not strangulated, it is not usual to interfere. If necessary to treat the condition, open the sac, reduce the contents, enlarging the ring, if necessary, by cutting outwards, and suture the muscle and skin separately. The peritoneum is usually ruptured.

Inguinal Hernia in the Bitch presents the known symptoms of a hernia in the inguinal region. It must be distinguished from a mammary tumour. The hernia sac comprises skin, mammary gland, and parietal peritoneum. The hernial contents may be bowel omentum or uterus, or a combination of these three structures. Uterus commonly forms the contents, and it may be pregnant. Treatment is on the usual principles for a hernia. Isolate the parietal portion of the sac, reduce the hernia, ligature peritoneal sac as high as possible, cut it off below the ligature, return the stump to the abdomen. Suture the external abdominal ring and skin separately, and seal with collodion and iodoform. Healing by first intention does not always occur, but complete cure is the rule. It is always wise and safe to open the sac before ligaturing it to make sure that the hernia is properly reduced. If it be incarcerated, the ring may be enlarged by cutting

outwards and forwards, and if the gravid uterus or uterine horn be too large to get back through the inguinal ring, hysterotomy and removal of the fœtus or partial or complete hysterectomy may be performed.

Crural Hernia.—A hernia through the crural arch. It is very rare in veterinary practice. It causes a swelling on the inner aspect of the thigh at the point where the saphena vein leaves the surface, and may lead to a straddling gait. If treatment is required, proceed in the usual way, and suture Poupart's ligament to the sartorious muscle. In case of strangulation, be careful with the knife of the femoral artery.

Perineal Hernia.—Mostly in old dogs, but also in other animals. It is manifested by a tumour showing the characteristics of a hernia on either side of the anus or valva just above the ischial tuberosity. It is due to a protrusion backwards or rupture of the posterior folds of the peritoneum between the rectum and vagina, or between the bladder and rectum, so as to allow the abdominal viscera to appear beneath the skin in the region mentioned. The bladder frequently forms the contents in the dog, and in this case there may be a difficulty in urinating.

Treat in the usual way by ligation of the peritoneal sac and suture of the skin.

Ventral Hernia is caused by solution of continuity in the abdominal wall as the result of external violence, impact of blunt bodies or of muscular effort, *e.g.*, during parturition. It is most common in the horse. Contents may be intestine, omentum, or both. When recent it shows the symptoms of a contusion or rupture of tissue in addition to those of the hernia. It is generally situated near the last rib on the right side in cattle, and at the same place on the left side in horses, but it may be situated at other parts of the abdominal wall. Its size varies from that of a man's fist to a man's head or larger. Treatment is the same as that for umbilical hernia, but it is not so likely to be successful here, especially if the hernia is close to the ribs, where the respiratory movements render closure of the ring very difficult.

Ventral hernia of the size of a man's fist is often seen in working horses without causing them any inconvenience. In such cases treatment is not indicated. Sometimes the hernial ring is so large and its lips so far apart that treatment is out of the question.

THE CHICAGO STOCKYARDS REVISITED.

BY THE SPECIAL SANITARY COMMISSIONER OF THE "LANCET."

(Abstracted by permission.)

DURING the four years that have elapsed since the shortcomings of the Chicago stockyards were first revealed in these columns notable alterations have been effected. It was in the month of January, 1905, that my four descriptive articles appeared. These were reproduced by the Chicago press and gave rise to many comments and much agitation. As a result reformed methods of inspection were introduced in the stockyards by the Chicago sanitary authorities on August 7, 1905, and, as was recorded in the *Lancet* at the time, with startling results. Of the 3,935,000 lb. of food condemned and destroyed as unfit for consumption during the year, 85·5 per cent. were so condemned during the five months following the introduction of the reforms. In the course of the ensuing year Mr. Upton Sinclair's novel, "The Jungle," appeared and popularized the whole question. Then it was that Mr. Roosevelt appointed Mr. Neill and Mr. Reynolds to visit the stockyards and to see whether the accusations made were justifiable. The report which these gentlemen drew up and the photographs which they took fully confirmed the descriptions given in this journal. The United States Department of Agriculture also took action and nominated a commission which investigated the question on the spot. This commission issued a report in which it quoted twenty-nine passages from the *Lancet* and eleven from "The Jungle." These passages, the criticisms of the United States Department of Agriculture, and my answer to them were published in full on July 14, 1906. Throughout my criticisms and contentions have been confirmed. The grievances were recognized as genuine, and the best proof that can be given of such recognition is the fact, to which I can now bear witness, that notable efforts have been made and considerable sums of money spent to do away with some of the worst features. A further proof that my criticisms were justifiable may be found in the eagerness with which visitors are shown the improved parts of the stockyards and the beautiful photographs of the same which have been issued to the public. A large number of these photographs have very courteously been sent to me. The United States Department of Agriculture confirmed my strictures and said: "It is true in many instances, sanitary features, such as light and air, are sacrificed to increase the capacity of the plants; we shall see that improvement has ensued upon these lines."

Distinct amelioration of the conditions can be seen when comparison is made with some other portions of the stockyards that still remain in a non-regenerate condition. The fountain-brush is a genuine improvement. Formerly the brush, which is very like a broom, was simply dipped in a pail of water and the sides of beef were rubbed down. Some of the dirt would drop into the pail and each time the brush was dipped in more dirt was introduced, and this was used to wash the next carcase. Thus in a very short time the water used for cleaning the beef was itself anything but clean. Sometimes instead of a brush made of bristles a rubber squeegee was used. Now the pail of water, which soon got dirty, is done away with altogether. A flexible pipe

comes down from a water main that passes overhead. The nozzle of the pipe is affixed close to the brush and discharges clean water on to the brush just as the sides of the beef are scrubbed. This is undoubtedly very much better than the old process, for it secures a greater measure of cleanliness. The same water cannot be used over and over again, for only clean water direct from the main flows on to the brush.

Another excellent innovation is the substitution of metallic for wooden wheelbarrows and trucks. These are used for conveying pieces of meat about and should be non-porous and easy to clean. But the old wooden trucks which were shown to me, and which are in some places still in use, cost £7, while the new trucks made of aluminium with galvanized-iron running gear cost £17. These latter and also some galvanized-iron tubs and buckets are now being substituted for the cheaper wooden utensils. This is notably the case in Libby's boning department. Here, in the gloom of a huge floor so broad that the light from the windows is altogether insufficient, men handle great pieces of meat and cut the bones out. With one hand they drive a hook into the flesh and hold it, while with the other they cut out the bone. Thus it is claimed that the meat is not often touched by the hands of these workpeople. The tables at which they work are made of wood, and they are now introducing a thicker or harder wood; for if wood is necessary for the cutting the harder the wood the easier to keep clean. On the other hand, the wooden legs of the tables are being replaced by iron ones. All this is good, and although the transformation is as yet only partially realized, still it shows that the packers are awakening to a knowledge of sound sanitary procedure. Perhaps the most radical change in regard to trucks and wheelbarrows is the provision of a large tank of boiling water in which, with the aid of a rope and pulley, the truck or wheelbarrow is lifted and then lowered, so that it may thus be cleansed and disinfected. In this and other ways the necessity of cleanliness is recognized, and some interesting improvements have been accomplished, but the first conditions of cleanliness are the purifying action of a plentiful supply of fresh air and the purifying action of direct rays of sunlight, and this seems to be not yet sufficiently acknowledged in Chicago. The boning department at Libby's works, where the new and costly aluminium wheelbarrows are being introduced, is dark in places and poorly ventilated. Aluminium plant is very much better than plant of porous and absorbing wood and praise must be given to those packers who have faced the expensive innovation, but plenty of sunlight and fresh air are also necessary.

Another innovation which is very ingenious, and is doubtless also very costly, has been introduced by Messrs. Armour and Co. This they describe as a "New mechanical beef-dressing table made of corrugated malleable iron, sterilized with hot water and caustic soda at every revolution. The most radical innovation ever inaugurated in the packing industry. Sanitary to the highest degree. Armour and Company." The description is quite correct, but the illustration, while it shows the application of aseptic ideas to the revolving table, indicates that there are close at hand recesses and corners where accumulations of dust might remain undisturbed. The mechanical table itself is a thoroughly ingenious invention and Messrs. Armour

and Co. are entitled here to the credit due to a valuable enterprise. Such a table must render good service if used in a properly constructed abattoir, where the beef, on being removed from an aseptic table, will be at once conveyed to some light, well-ventilated department where absolute cleanliness reigns, but if regard for these essentials is anywhere neglected the value of the table will be minimized. The revolving and ribbon-shaped table carries the carcases along so that they may be dressed as they pass various attendants. Then when it has finished its upper horizontal course it turns round a drum and is immersed in a long tank of hot water placed under the table and in which caustic soda has been dissolved. Just as each leaf of the table emerges from this bath jets of water play upon it and give it a final scour. Undoubtedly this is a remarkable piece of machinery. The very critical might suggest that if the entire premises were constructed on different principles such special care over this one detail would not be necessary, but this would be a grudging recognition of the fact that the complaints published have borne fruit and that efforts are being made towards genuine improvement.

When at the end of the year 1904 I paid my first visit to the Chicago Stockyards the condition of the women employed in manipulating the tins was most deplorable. Even the women who handled meat after it had been cooked and just before it was sent out to the consumer did this work under dirty and insanitary conditions. There were women packing tongues close to others who used steam jets to sterilize tins, thus causing excessive heat and damp, while also close at hand there were cold-storage rooms. Women put their aprons on their heads as a protection from the wet atmosphere, but this did not prevent their breathing the fine particles of the blue paint used for colouring the tins. Then, in some cases, there were closets close to the food, which at times were out of order and devoid of flushing. In one department, where eighty women worked, there were but two dirty unflushed closets. Wearing what shabby clothes they might possess, with hands dirty from work and neglect, they handled the food and pushed it into tins. There were no suitable lavatories, and an altogether insufficient supply of closets was provided. The better inspection of meat instituted by the City of Chicago authorities in August, 1905, was followed in April, 1906, with an inspection of the conditions under which the women worked. This led to a further increase in the number of inspectors appointed by the city. While these inquiries were pressed forward the celebrated Neill-Reynolds report was published, and this led to national legislation. Regulations were issued by the Federal Government intended to render the existence of such insanitary conditions as those described by the city inspectors, by the Neill-Reynolds report, by Mr. Upton Sinclair, and, in the first instance, by myself, an impossibility in the future. Both the central or Federal Government and the local Chicago regulations or bye-laws insist that all employees who handle food must be clean in person and attire. The most recent of these laws is Order 150 issued by the Bureau of Animal Industry, which became effective on April 1, 1908. It says in Section 7 of Regulation 10 that persons affected with tuberculosis shall not be employed in the handling of meat.

The denunciations of the Chicago stockyards principally affected the sale of tinned meats. According to Mr. George P. McCabe,

Solicitor for the Department of Agriculture, the falling off of the export in canned meats in 1906 "shrunk temporarily at least 50 per cent., while the average value of exports of fresh meats has been maintained." It is, unfortunately, sometimes necessary to touch people's pockets before they can be stirred to energetic action. However, it is satisfactory to be now able to record that the criticisms made have borne fruit.

In my previous criticisms, published more than four years ago, I said that there did not exist throughout these vast stockyards a single slaughter-house in the technical sense of the term. Now that I have revisited the stockyards I may repeat this assertion. In spite of all the complaints made, the public agitation, and the new laws enacted, the same barbaric methods of killing prevail, and this in buildings that in nowise resemble an abattoir, and are therefore not suited for the purpose. But if there are no slaughter-houses in the technical sense, the public and the consumers generally may be congratulated on the fact that within the last two years a packing-house has been constructed which complies in the fullest manner with modern sanitary demands. This is known as "Libby's White Enamelled Kitchen," a curious name to give to a huge nine-storey building. As a matter of fact, the kitchen only occupies the ninth and uppermost floor of the new building in question. Then there are foundations, concrete caissons 8 ft. in diameter, that go down to a depth of 30 ft. below the ground. This is necessary on account of the great weight of the machinery and the accumulation of stores. The first and second floors contain dynamos, motors, steam generators, ice machines, and many other mechanical contrivances. The third floor is devoted to the expedition of orders. Here huge crates are filled with thousands of tins containing preserved food, and are sent to all parts of the world. The fourth and fifth floors are storage floors where cans, bottles, and jars of all sizes and shapes await purchasers. From the sanitary point of view, the chief interest commences with the sixth floor, which is called the round-can kitchen; not that anything whatsoever is cooked there, but the round cans are filled with the meats that have been cooked at the top of the building. On the seventh floor the square cans or tins are filled. The eighth floor, being immediately under the kitchen, is the trimming room. The kitchen on the top or ninth floor consists of long rows of cauldrons that look more like iron cases or tanks. Close handy are numerous wide-mouthed shoots. These are enamelled, and conduct the pieces of cooked meat on to tables in the room below, where they are cut into convenient sizes to fit into the tins. The first praiseworthy feature is that all the walls from the sixth floor upwards are faced with Tiffany pure white enamelled brick. Where the food is handled after cooking the angles of the floors are rounded by terra-cotta enamelled mouldings. Thus the usual sharp corners where dirt accumulates have been done away with, and there is a glassy surface that is non-absorbent and very easy to clean. The tables, trucks, and tools are all made of metal or are enamelled; there is no wood. The floors are of mosaic, and the top or kitchen floor is of iron on concrete. Throughout the floors are watertight, and channels are so laid as to drain off the water used in scouring. The enamel looks beautifully bright, white, and clean. Large steam escape ducts keep

the atmosphere clear, but where there is dampness iron ledges or narrow platforms have been constructed to afford dry standing ground. If any fault can be found, it would be in the fact that the building is rather too wide, and the central portions are consequently not quite near enough to the windows. These, however, are very large and numerous, and open on the cantilever system, and there are also some air-shafts to supplement the ventilation derived from the windows. The window sashes are of metal, so that here again the use of absorbent material such as wood is avoided.

In this great building women and men work on alternate floors, and there is for each floor an admirably instituted lavatory well away from the working room, with luxurious provision of basins, soap, towels, &c. But more than this, the services of a professional manicure have been secured. This important official has an operating table and all necessary toilet utensils, and one after the other the workers come to have their nails cleaned and pared and their hands kept in perfect order. This certainly impressed me as a refinement that surpasses anything I have met with before; and yet how simple and obvious it is. That ladies spend quite large sums of money upon manicure so that their hands may appear to the best advantage when they go into society is so well known a fact that it causes no comment. Yet surely it is far more necessary to bestow every possible attention on hands that all day and every day touch the food which countless thousands and thousands of people are going to eat. It was therefore with the greatest satisfaction I noted that the manicure seemed busy all the time, and I was still better pleased to observe the results of her endeavours in the neat appearance of the nails and the cleanliness of the hands that manipulated the meat and put it into the tins.

The pity of it is that these principles are not applied throughout the stockyards. One large establishment still has many reforms to execute. The top floor is devoted to pig-killing, and here there are ordinary porous brick walls and a good deal of boarding. While these insanitary conditions were allowed to remain money had been found to introduce some new machinery for the purpose of reducing the cost of labour in scraping the bristles off the pigs' backs. After the bristles have been loosened by immersing the pig for some time in boiling water it is pushed to a compartment where it is mechanically patted on the back with such rapidity and violence that nearly all the bristles are shaken off. Then it passes before cleaners who scrape off what little remains. Now comes the turn of a veterinary inspector, who examines the throat, because by this time the head has been partially detached. A little further, the pig is cut open, and a second veterinary inspector examines the viscera, while at a third point the carcase passes under inspection. While thus travelling round the pig is suspended by its hind legs to an overhead rail, and underneath there is a wide-mouthed trough, so that most of the blood falls inside this receptacle, and does not soil the floors. This is an improvement. Then again the ledge or platform by the trough provided for the men to stand upon is now made of iron, while formerly it was of wood, and this is another improvement.

On the cattle-killing floor of the same building there is much woodwork—wooden pillars and rafters. On these the blood splutters

much higher than can be reached by ordinary cleaning. Here the old state of affairs still to some extent prevails, though in some instances the use of iron has taken the place of wood. The floors are so wide that in the centre it is impossible to see, and artificial light must be employed in the daytime as well as at night. On one of the huge floors thus illuminated in its centre during the day sheep are killed at one end. These animals are healthy in themselves. Indeed, the veterinary inspector in charge expressed the opinion that the public would hardly be any worse off if the carcases of the sheep were not inspected at all. The diseases to which sheep are subject are generally discovered during the *ante-mortem* examination. To me, however, this seemed all the greater reason why this sound and safe meat should be carefully separated and kept at a distance from all dirty and dangerous work. Nevertheless, we have here on one side of the floor the suspended carcases of sheep that have just been killed, skinned, and cut open, and that pass in processional order before the dressers and inspectors, while the other half of this same floor is devoted to the opening of pouches and the cleansing of the intestines of cattle that come tumbling down shoots from the killing floor above. As the pouches fall they glide along an open channel. This is made of metal, and contains water. As they glide past attendants cut off the fat and other portions that are of some use, so that the pouches are pretty well denuded by the time they reach the end of this slanting trough or channel. Here there is a large gaping mouth, and at this point the pouch is cut open and its contents are poured out. In defence of doing this dirty work close to fresh and good meat, it is claimed, first, that the pouches only contain undigested food, and not fæcal matter, and, secondly, that this matter does not remain on the spot, but at once drops down the mouth and the shoot into which it is emptied. But, of course, odours are given off, and the atmosphere in which the fresh, sound sheep carcases hang is affected. Then if there is no fæcal matter in the pouches there is plenty of it a few steps further on where the intestines are emptied and cleaned. The part of the floor selected for this extremely obnoxious work is precisely the very worst that could be found, for it is as far away as possible from the light and air of the windows. The most impure work is done just where there is no possibility of natural purification, a spot which the daylight can never reach and where the workers have to employ artificial light all the time. Here there is a large sort of platform or table in which holes are cut where men stand, the table being thus all around them, and it reaches up to their waists. On this platform or table the intestines are delivered by shoots from the killing floor above. From the ceiling there hangs from a waterpipe a number of india-rubber tubes with a tap at their lower end. This tap is inserted in one end of an intestine and the water turned on. The other end of the intestine is held over a little hole that is close at hand. The contents of the intestine are forced out by the current of the water and by pressure. They then flow into a drain-pipe to a catch-pit where heavy matter is retained and the more liquid portions flow into the sewer. The whole process is necessary, and the work can in no way be made into a pleasant and agreeable task. But here I think proprietors who have shown in some directions their desire to improve the old conditions might well make alterations. Obviously the best

lighted and ventilated premises should be used for this dirty work. Such premises should also be quite distinct, widely removed from the slaughter-houses and the places where meat is dressed or carcases are examined, and constructed without dark corners or places under hedges, tables, channels, and troughs where purifying light can never penetrate, and which are beyond the reach of the broom or brush of the diligent cleaner.

It must be allowed that there are still structures employed in the Chicago meat trade where there is a total disregard of aseptic conditions, little attempt to make the killing floors watertight, many cracks and small crevices where dirt can secrete itself for a long while, and much wood—worn, battered, softened, and spongy wood, constituting a real harbour for germ life. The only excuse given, and that can be given, is that it is too big a task to do away with all these structures at once. This is true, but why was the erection of such structures ever allowed?

To analyze the new laws that have been enacted in response to the agitation against the Chicago stockyards would take much time and space, and is not within the design of these articles. I am anxious to record my personal impressions on revisiting the stockyards now that better laws exist and improvements have been effected. But laws are not of much use unless there is an effective machinery for putting them into force. At the commencement of the year 1906 it was publicly stated that the Federal Government of the United States employed in the packing-houses of the entire country a total of 411 inspectors, and it was then calculated that if these inspectors were on duty for eight hours during 300 days in the year they would have to examine 105 animals per hour. Dr. A. D. Melvin, Chief of the Bureau of Animal Industry, last October very courteously wrote to me, saying: "I also take pleasure in giving you the following figures concerning the Federal meat inspection: This inspection is conducted at 338 establishments at which animals are slaughtered. The total force employed numbers 2,290, of whom 702 are veterinarians. The force at Chicago numbers 344, of whom 108 are veterinarians. These figures do not include clerks."

This simple statement of fact is eloquent, and shows that much has been accomplished in a short time. Nevertheless, and in spite of the increase of the staff, I could not but feel scandalized when I saw the manner in which the veterinarians and inspectors were made to work. The dignity of a scientific profession is entirely sacrificed to the necessity, or imagined necessity, for speed, and it is difficult to do good professional work under completely faulty conditions. Highly qualified men of science are made to hustle along in semi-darkness through filth and slush, ever "speeding the pace," the victims of a spirit of rush by which some efficiency must be lost. The giant engine is concealed in the darkness below, ever churning and churning, turning hundreds of fly-wheels, transmitting its power to thousands of little wheels on which animals both dead and alive are suspended and move forward among the butchers, the dressers, and the skinners. While these animals, as they travel along, are being killed, flayed, and cut open, the veterinary surgeon follows and inspects. So that this inspection shall not occasion any delay, the labour is subdivided. The glands of the neck are hastily felt as the animal passes the first inspector; the viscera as they are cut

out glide down a slope in front of a second inspector; and, finally, the carcase is looked into, after the viscera have been removed, as it passes the third inspector. The viscera of pigs have to be examined with such rapidity that a relief veterinarian stands behind the inspector to help him in case of exhaustion and delay. There was something so degrading about this unseemly haste, that I could not help reflecting on the old condition of slavery in the Southern States, and wondering whether stricter servitude could have happened there and then. It was only necessary to place a man with a whip behind some of the veterinary inspectors to have a picture of slavery worthy of "Uncle Tom's Cabin." That ignorant immigrants should be driven to earn their living in revolting circumstances is as deplorable as it is inhuman, while every country has its way, or more than one way, of oppressing the hungry operative. These, alas, cannot help themselves; but surely such is not the case with members of a learned profession, who have the honour of representing, as Government functionaries, the wealthy United States of America. It is high time the veterinary surgeons in the employ of the United States Government should insist on being treated with due consideration, should refuse to be hurried in the way that they now are, or to do their work in dark, crowded, unclean places. They should insist on having all the leisure necessary to pause and to deliberate over any doubt that may arise in their minds, instead of having, as at present, to keep pace with a machine. Also, how can science progress if a scientific man is, by the subdivision of labour, kept all the year round doing exactly the same detail of *post-mortem* examinations? Veterinary inspection, as I saw it, clearly serves useful purposes; but it can only be really efficient by altering the conditions of the work.

On the killing floor for large animals the veterinary surgeon has to walk up and down examining the viscera. On one killing floor this meant, I was assured, that on ordinary days the inspector, in going backwards and forwards, walked from 7 to 8 miles, and when there was a great rush of work he might have to walk some 10 miles. My general impression of the killing floors is that, on the whole, more light and air are admitted than used to be the case. There still remain many dark recesses and wide spaces where artificial light continues to be necessary even during the daytime, but there is real improvement. Many impervious bricks are now employed so as to render the floor watertight, and if it is suggested that this is not due wholly to a newly acquired consideration for public welfare, the result is the same. The impervious floors prevent the contamination of the subsoil, and at the same time facilitate the collection of a larger quantity of blood, fragments, and grease that constitute marketable and valuable by-products. While the work is going on these floors are not flushed and washed every time they are soiled. They remain, at least to the end of the day, stained with blood and grease. The atmosphere becomes close, superheated, damp, stuffy, and ultimately foul odours predominate. There has been some improvement, but we are still far removed from the German standard of aseptic construction and management. Nor is there in Chicago anything like those palatial public abattoirs which the Germans boast can be visited in a dress suit. The circumstances are not, of course, quite comparable, but the knowledge of what can be done in Germany, and what is beginning to be done in other countries,

should spur the American to emulation, even though profits might temporarily be diminished.

One part of the stockyards, and it is by far the largest part, which has been left untouched, in spite of all the agitation, comprises the 13,900 uncovered pens and the 8,500 covered and double-storeyed pens. The daily capacity of this enormous market is set down at 75,000 cattle, 125,000 sheep, 300,000 hogs, and 6,000 horses. With such an accumulation in the one area of live-stock, it would have been thought that the utmost precautions would be taken. All that has been done is to pave the ground more completely than formerly. The only excuse for not doing this sooner was that the bare earth was less likely to hurt the animals' feet. The bare earth, however, could not be washed, and was soon converted into muddy manure, which was certainly not good for the cattle. For miles and miles there stretch rough wooden palisades or railings, dividing up the ground into square pens. To reach all these no less than 25 miles of roadways are necessary. Needless to say, these wooden partitions should be abolished and iron substituted. In the meanwhile they should be limewashed at frequent intervals, but even this elementary precaution is neglected. What, however, may be considered far more astounding is the condition of the quarantine station. When cattle come from a district where a contagious disease prevails, the railway van that bears them is labelled "exposed." The cattle that have been exposed to infection are sent to a special platform, grandiloquently called the quarantine station. Naturally, I expected to find a broad platform made of concrete or other impervious material, well protected by iron railings, and a hose in various points of vantage, so as to clean all the flooring at the passage of every suspected herd of cattle. To my intense surprise, the platform was made of rough, irregularly laid planks, fitting so badly that it would have been impossible to clean them properly had such an attempt been made. Instead of carefully painted iron railings to enclose the platform, there were only rough wooden boards, that were neither painted nor whitewashed. On all sides there were traces of manure, and the railway lines stood over bare ground. Though some of the animals that land here are undoubtedly diseased, no effort is made to secure some measure of cleanliness and to prevent their droppings drying on the platform and being blown as dust to the pens not far away where healthy cattle are kept.

After being landed on this germ-preserving platform the quarantined animals are brought to pens that are not only exactly like all the other pens, but are close to them. Quarantine only consists of a roadway space that is about 15 ft. broad. At Frankfort, I remember, the whole of the railway system separated the quarantine slaughter-house and lairage from the ordinary slaughter-house and pens; and, further, no one was allowed to go over from the one to the other. In other places—Breslau, for instance—there is a high and massive wall to cut off all communications with the quarantine section, or it may be a river or field that separates the two services. Here at the Chicago stockyards there is nothing whatsoever but 15 ft. of space. The greater part of the pens are in the open air. There is no shelter whatsoever for the cattle, whether they are well or sick. This, considering the grave rigour of the winter at Chicago, must at times entail a great deal of suffering. In much milder climates—at

the Paris cattle market and abattoir, for instance—the pens are roofed over with glass on an iron framework, and, of course, there are no wooden partitions. Still, it is considered necessary constantly to discharge superheated steam on the concrete flooring and the iron railings so as to sterilize as well as to clean them. If all the animals taken to Chicago were at once slaughtered, it might be said that, even if they did contract a disease from the insanitary condition of the stockyards, it would not matter, for they would be killed before the period of incubation was over. But this is not the case. A large number of the animals sent to the Chicago stockyards are sold alive, brought away alive, and, especially in regard to cattle, a considerable proportion of them are shipped, I believe, to England. They land at Birkenhead or by the Ship Canal at Manchester, or they come up the Thames to Deptford.

If the open-air pens expose the animals to all the rigour, the extreme heat and cold of the climate, the covered pens at the stockyards which I was able to visit are a perfect abomination. Here sheep are allowed to sleep on earth floors which are so saturated that a strong smell of ammonia prevails throughout. There is dust caked all over the rafters and ledges. The first covered pen I visited had not been cleaned out, so I was informed, for five months. Upstairs the first floor was also disposed as a sheep pen. Here there was more light, as it could come through the roof, but there was no drainage or washing attempted. Occasionally some of the manure was just shovelled out. The smell of ammonia was most offensive. It seems incredible, considering the number of modern model cattle markets that have been built in various parts of the world, that such filthiness should be tolerated in a progressive city like Chicago. It would seem simply as if the necessity of cleanliness was not acknowledged. The floors cannot be washed, or they are not washed. There is no drainage whatsoever by which the liquid manure can escape. Therefore, the urine saturates the floors, and the pungent odour of ammonia is ever present in the air. The rafters of the roofs are made of planks some 8 in. broad, and placed barely a foot apart. They are made of rough, unpolished wood, with little splints sticking out like bristles, which form an excellent framework to catch cobwebs, which form nets that hold dust and dirt in suspension. Cobwebs abound on all sides, and within easy reach, but no one has taken the trouble to remove them. There is, on the upper floor of the pens I saw, a good light, and the air can circulate freely in hot or mild weather when the apertures are not closed. What happens in winter I cannot conjecture. The persons responsible for this structure should be made to live there and report on their sensations. In the drinking troughs there is an overflow pipe on a level with the top of the troughs. This overflow might have been used to make a current in the surface drains that should exist on the floors of all pens and stables. But in this case the water is wasted by being made to flow in a pipe, and is lost outside.

It will be seen, therefore, that there still remains much to be done at the Chicago stockyards before they can be compared with the standard now established for the construction of public cattle markets and abattoirs. Perhaps the trouble is that no model of such a structure exists in the United States. At New York I did visit a slaughter-house which had been pointed out as a model institution, but it could

not be compared for one moment with what I have seen in Germany, Switzerland, or France. A much greater number of experts from the United States should come and study these matters in Europe, but more especially in Germany. This seems indispensable, at least till such time as one or two proper and model abattoirs are constructed in the United States. Now that the spirit of reform has penetrated the Chicago stockyards, and that some notable improvements have been effected, it is perhaps not too much to ask that the standard realized in Germany or at Basle in Switzerland should be introduced in the United States of America.

MEAT AS A SOURCE OF INFECTION IN TUBERCULOSIS.[1]

BY ARTHUR R. LITTLEJOHN, M.R.C.S., L.R.C.P., M.R.C.V.S., D.P.H.

WHAT is meant by the term "Meat"? As used in this paper the term includes not only the flesh but all parts of the animal body that are utilized for human food. Most parts of the animal body are used for human food, for amongst the poor the liver, lungs, udder, and mesentery are eaten.

WHAT "FOOD ANIMALS" ARE AFFECTED WITH TUBERCULOSIS?

All our "food animals" are liable to infection.

Cattle.—About 20 per cent. to 30 per cent. of our cattle are to some extent tuberculous. Young cattle up to 1 year old are rarely affected (about ·05 per cent.), but the percentage increases with each year of life, and in old milch cows, 10 to 15 years old, may reach 75 per cent.

Pigs.—About 4 per cent. to 5 per cent. of our pigs are tuberculous. Seeing that in pigs tuberculosis tends to generalize so rapidly they are quite as serious a source of danger to man as cattle, although a smaller percentage are affected.

Birds.—It is difficult to give even a rough estimate of the percentage of cases of tuberculosis in fowls, but the disease occasionally becomes a plague, for the stamping out of which destruction of both fowls and buildings is necessary.

Other domesticated birds—turkeys, ducks, and confined pheasants—are occasionally affected. Avian tuberculosis is, no doubt, the same disease as mammalian tuberculosis, but elaborate methods (viz., repeated passages through animals) are necessary in order to infect fowls with human tuberculosis.

According to Nocard, avian tuberculosis is not transmissible to man.

Sheep and Goats are rarely affected (about ·002 per cent.).

Rabbits are very susceptible to experimental infection, but are rarely attacked naturally, even when kept in confinement.

Horses in this country are not much used for human food, and in them tuberculosis only occurs in about 1 per cent.

It will thus be seen that cattle and pigs are the only food animals in the consumption of whose flesh there is any serious danger of

[1] Read before the National Tuberculosis Congress in London, February, 1909.

tuberculosis being transmitted to man. It is not surprising, therefore, that most of the investigations concerning tuberculosis from eating meat have been made on cattle and pigs.

Can Man Contract Bovine Tuberculosis?

Von Behring, in his Cassel Lecture (1905), stated that he believed the source of infection with tuberculosis in adult human beings was an infantile contraction of bovine tuberculosis through feeding children on milk, and that the tuberculosis remained latent until re-started in adult life.

Ravenel, in 1905, pointed out that the bovine tubercle bacilli had a much greater virulence on other animals than had human tubercle bacilli, and he argued that it would be remarkable, seeing how susceptible man is to tuberculosis, if he were immune to the more powerful virus.

Koch, in his Nobel Lecture, 1906, stated that he believed that bovine tuberculosis was not transmissible to man, but qualified his statement by saying that at anyrate generalized tuberculosis and, above all, pulmonary tuberculosis of man, was never the result of transmission of bovine tuberculosis. The generally accepted view now is that human tuberculosis may be and is caused by bacilli of either bovine or human origin.

The Royal Commission, in its second interim report, 1907, confirmed the conclusions come to by various individual investigators that there is a bovine and a human type of tubercle bacillus, and that these are distinct and recognizable.

Theobald Smith had previously (1898) obtained two types of tubercle bacilli from the mesenteric glands of children, one type of which conformed to the distinctive tests of bovine tubercle bacilli. In a later paper (1905) he also quotes other authorities who had obtained the bovine type from man.

The Imperial Board of Health in Berlin, under Kossel (1905), records finding bacilli of the bovine type six times in fifty-six cases of human tuberculosis. These results were, with one exception, obtained from the mesenteric glands or intestinal ulcers of children. The sputum of tuberculous adults, however, invariably contained the human type only.

The Royal Commission, in its second interim report, 1907, found that ten out of nineteen cases of primary abdominal tuberculosis, three out of eight cases of tuberculous cervical glands, one out of four cases of tuberculous sputum, none out of ten cases of tuberculous lungs in human beings, were due to bacilli of the bovine type.

Primary tuberculosis of mesenteric and cervical glands causes less than 10 per cent. of the total mortality from tuberculosis in this country, and from the foregoing it will be seen that about half (thirteen out of twenty-seven) of these are bovine in origin. We may therefore assume that 5 per cent. to 10 per cent. of the human mortality from tuberculosis in this country is due to infection from bovine sources.

Infection by Ingestion in Man.

Experiments have shown that ingestion as a means of infection in tuberculosis requires the swallowing of large numbers of tubercle

bacilli unless the intestinal mucous membrane is not intact, in which case a small number will often suffice. The great rarity of primary tuberculosis of the tongue, oral cavity, and alimentary tract generally in adults and the comparative infrequency of primary tuberculosis of the mesenteric glands, except in children, indicate that ingestion as a means of infection in adults is rare. The comparative absence of primary tuberculosis of the mesenteric glands in adults is important, for experiments have shown that unless large numbers of tubercle bacilli are ingested the intestinal mucous membrane often escapes any local lesion, whilst the mesenteric glands become infected (Sidney Martin).

The presence, however, of abdominal tuberculosis is apparently not essential in all cases of tuberculosis from ingestion. Calmette's and Guerin's experiments led them to believe that tuberculosis of the bronchial glands and lungs could result from feeding with tuberculous material without any intestinal or mesenteric lesions being found.

Latham, in confirming Woodhead's work, showed that tubercle bacilli were present in the tonsils in seven cases out of forty-five consecutive children examined. Active tuberculosis of the tonsils is seldom seen, but the harbouring of tubercle bacilli by the tonsil probably precedes and leads to many of the tuberculous cervical glands in children. By spreading down from these along the lymphatics of the neck the tubercle bacilli reach the bronchial glands, and have been found to originate in this way an attack of pulmonary tuberculosis. That this is a commoner occurrence than is usually believed is suggested by the frequency with which pulmonary tuberculosis in children starts near the root of the lung adjacent to the bronchial glands. The fact, however, that during a period in which the use of meat as human food has greatly increased human tuberculosis has greatly declined, suggests that meat is not a serious source of infection (Royal Commission).

The comparative frequency of the alimentary origin of tuberculosis in children who ingest more unboiled cows' milk than do adults indicates that milk, rather than meat, is the usual source of infection by ingestion.

Distribution of Tuberculous Lesions.

In Cattle.—The commonest seats of tuberculous changes are (1) the bronchial and mediastinal glands, (2) the lungs and pleura, (3) the peritonæum, mesenteric glands, liver, pharyngeal glands, udder, and kidneys, more or less in the order given.

In about 50 per cent. of all cases of tuberculosis the lungs, with their lymphatic glands, and the pleura are simultaneously affected. In about 30 per cent. the lungs and their lymphatic glands are alone affected. In about 20 per cent. the serous membranes alone are affected.

In the adult ox the spleen itself is almost exempt from tuberculous changes, although its peritoneal covering suffers as frequently as the rest of the peritoneum. In very advanced cases the intestines and uterus may be involved, and occasionally the bones are affected. But tubercular lesions in the muscular tissue itself are very rare.

In Pigs.—The method of infection being almost always by ingestion, the lesions are, as one would expect, almost constantly in some part of

the alimentary tract. Not, as a rule, till generalization occurs (and there is a great tendency to rapid generalization in the pig) are the lungs seen to be affected. The most frequent seats are the tonsils and the glands of the throat, but the small intestine and mesenteric glands are also commonly affected. The bones—particularly the vertebræ—are more frequently affected in pigs than in cattle, but muscular lesions are rare.

The Flesh of Tuberculous Carcases.

As the result of numerous experiments it is generally believed that, except in the case of local extension, the flesh is only dangerous whilst tubercle bacilli are circulating in the blood. If there is a miliary tuberculosis of the organs this certainly has occurred, and investigations teach us to suspect its occurrence (1) in the acute stages of tuberculosis; (2) when foci have softened and become purulent, or when there are actual cavities containing pus; (3) when a tuberculous lesion has encroached upon and caused ulceration of the intima of a blood-vessel or the thoracic duct. In all these cases it is probable that tubercle bacilli have occasionally gained access to the general circulation, and in such cases the flesh is, or has at some time been, dangerous.

Demonstrable naked eye and even microscopic lesions are exceedingly rare in the muscular tissue, except by local extension from a tuberculous bone, joint, or gland. Animals have been fed on flesh from tuberculous carcases by many experimenters, but when nothing except flesh has been given, positive results are few, even when the carcases of animals that had suffered from generalized tuberculosis supplied the meat substance.

(1) Nocard records having infected one of four guinea-pigs by intraperitoneal inoculation with muscle juice from twenty-one cows affected by generalized tuberculosis. The flesh of the cows that caused infection, however, failed to infect any of four cats fed on it.

(2) Galtier records similar experiments where he fed cats, dogs, and pigs with as much flesh from tuberculous cattle as they would eat. No case of tuberculosis resulted, although samples from two of the carcases contained muscle juice that infected with tuberculosis rabbits which were inoculated subcutaneously.

(3) Recognizing that infection by ingestion was difficult, Van der Sluys fed ten young pigs with flesh from animals suffering with acute generalized tuberculosis, adding bone splinters to it. Three of the ten pigs developed tuberculosis.

(4) Garlach records feeding pigs with flesh from a tuberculous sheep and finding that two developed tuberculosis.

(5) Peuch records three positive results when inoculating three rabbits with the muscle juice from a fowl that died of tuberculosis.

Experiments have been uniformly positive when the muscle juice from human beings dead of phthisis has been used.

Although there are a few contradictory inoculation experiments, the majority have shown that in cattle, even in advanced cases of tuberculosis, and in generalized tuberculosis, the muscular tissue itself is very rarely infective, even with such a delicate test as the inoculation of raw muscle juice into the peritoneal cavity of guinea-pigs. Many of the positive results have been accounted for by contamination

of the muscular tissue during its removal from a tuberculous carcase. This almost constant absence of tubercle bacilli in the muscular tissue has been accounted for by the acidity of muscle being unfavourable for their growth. It is possible, however, that when tubercle bacilli are circulating in the blood, the capillaries of various organs have a greater selective power for them, and as a result few are arrested in the capillaries of the muscles. (M'Fadyean.)

M'Fadyean and Nocard have both shown that within a few hours of injecting large numbers of tubercle bacilli into the circulation, the muscles fail to contain any, while the blood itself is free in three to six days.

Even in pigs, in which generalization is so frequent, experiments fail to demonstrate tubercle bacilli in the muscle. Positive results have, however, been more frequent when using the muscle of tuberculous pigs, sheep, and fowls instead of cattle.

From the foregoing we may conclude that the flesh of tuberculous animals is not necessarily infectious. In many, if not the majority, of cases, when the flesh is infectious this is the result of contamination by means of the knife, butcher's cloth, &c. This occurs during the dressing of the carcase, either from the carcase itself or one previously dressed. It has previously been stated that large numbers of tubercle bacilli are necessary to infect by ingestion, and seeing that in the majority of cases tubercle bacilli are absent altogether in the meat, the occasional positive result obtained by inoculating a guinea-pig intraperitoneally does not justify us in saying that the meat would have infected man had he eaten it. It has been stated that Hebrews suffer less than other races from tuberculosis, because of the more careful selection and supervision of the meat they eat. Such statements are incorrect, and have been shown to be so by numerous authorities. The occasions in which tubercle bacilli are liable to gain entrance to the general circulation have already been indicated. In such cases one should look for tuberculous foci of varying ages in the liver, spleen, and kidneys. The intermuscular lymphatic glands would at the same time be affected, and would show more advanced lesions than those in the organs. In suspected cases, therefore, these glands should be microscopically examined, and the carcase judged accordingly. To remove all the intermuscular glands before the flesh is allowed into the market would be impossible. Although, therefore, the flesh itself is not infective, its glands make it dangerous. Besides the flesh there are other parts of the animal body that are eaten. Most of the internal organs are a common form of diet, whilst the poorer classes eat the lungs, udder, and mesenteries. All these organs are often highly infective in a tuberculous carcase, and are therefore a source of danger to man.

Inspection of Carcases.

From the foregoing it will be seen how essential is a proper system of meat inspection. Unfortunately, under present conditions in Great Britain, the stringency or laxity of the inspection, instead of being statutory, rests with the sanitary authorities or those persons appointed by them. As a result there is doubtless much tuberculous "meat" reaching the market.

Take, for instance, a district in which the inspection of meat is

thorough, whilst in neighbouring districts it is purely formal. What results? Cattle, instead of being slaughtered in the district well inspected, where seizure would be almost certain, are slaughtered in an adjacent district badly inspected, and the carcases sent to market in the otherwise safe district. This is probably happening all over the country, and will continue to happen until comprehensive regulations are made, and enforced by statute throughout the country.

The Royal Commission made certain recommendations which are adhered to in some parts of the country and quite ignored in others.

The recommendations for tuberculous carcases of cattle were: (*a*) When there is miliary tuberculosis of both lungs; (*b*) when tuberculous lesions are present on the pleura and peritoneum; (*c*) when tuberculous lesions are present in the muscular system or in the lymphatic glands embedded in or between the muscles; (*d*) when tuberculous lesions exist in any part of an emaciated carcase—the entire carcase and all organs may be seized. (i.) When the lesions are confined to the lungs and the thoracic glands; (ii.) when the lesions are confined to the liver; (iii.) when the lesions are confined to the pharyngeal lymphatic glands; (iv.) when the lesions are confined to any combination of the foregoing, but are collectively small in extent—the carcase, if otherwise healthy, shall not be condemned, but every part of it containing tuberculous lesions shall be seized. Whilst for tuberculous carcases of pigs, they recommended complete seizure under all circumstances on account of the great tendency to generalization. But an inspection improperly carried out may do more harm than good. The inspector, for instance, if he is careful during his examination may contaminate sound parts of the carcase with tuberculous material. Bearing in mind the possibility of contamination in this manner, one should as far as possible examine those organs which appear healthy before cutting into those obviously diseased, and having examined one carcase should use a fresh knife, &c., or boil those used, before examining the next carcase.

Roughly speaking, the examination should be made on the following lines: The head having been removed and the carcase halved, begin the examination at the hind-quarters and work forward to the head and neck.

(1) Examine the meat substance and in the hind-quarters the lymph glands for that area, *i.e.*, popliteal, precrural, and inguinal.

(2) If the peritoneum appears healthy, examine next the iliac and other retroperitoneal lymph glands. If obviously diseased, leave these glands till later.

(3) Examine the vertebræ, ribs, and sternum.

(4) Examine the prescapular and axillary lymph glands.

(5) If the pleura appears healthy examine the sternal and intercostal lymph glands.

(6) Examine the mesenteric lymph glands, the udder, kidneys, spleen, liver, and lungs with their lymph glands, in that order.

(7) Examine the head and the submaxillary and retropharyngeal lymph glands. Always avoid cutting into tuberculous foci until the healthy parts of the carcase have been examined.

The Effects of Cooking on Tubercle Bacilli.

Large numbers of experiments have been carried out to show the power of resistance of tubercle bacilli to heat, and the results show

that it is moderate. Ten minutes at 75° C. is said by Jensen to be sufficient to destroy the vitality of tubercle bacilli; whilst experiments by Forster show that fifteen minutes at 65° C., ten minutns at 70° C., and one minute at 95° C. are sufficient.

Schmidt (Mulheim) found that, without exception, tubercle bacilli lost their virulence at the coagulation point of albumen.

More to the point are the experiments of Woodhead for the Royal Commission given in Report I., 1895. Working on the hypothesis that the flesh of tuberculous animals was rarely, if ever, infective, unless soiled during dressing of the carcase, he artificially infected the flesh before experimenting. In some cases he injected tuberculous material into the interior of the meat substance, and in others he smeared slices of meat and formed them into "rolls." The latter experiment is of importance, as it is the custom for butchers to make such "rolls," and they frequently include minced lungs, omentum, &c., structures which are often highly virulent.

Having subjected his samples to the ordinary processes of cooking, and noted the temperature at various depths below the surface, he took the central portions of them for feeding and inoculating animals.

The conclusions he came to were:—

(1) The centre of a "joint," weighing 6 lb. or over, never reached a higher temperature than 60° C. (140° F.) during ordinary cooking.

(2) "Rolls" of meat of more than 3 lb. or 4 lb. weight were not rendered sterile throughout, and therefore cooking could not be relied upon to render innocuous "rolls" with smeared tuberculous centres.

(3) Ordinary cooking was sufficient to destroy any smeared tuberculous material on the outside of a "joint" or "roll."

(4) The most reliable method of cooking is boiling, then roasting in an oven, and the least reliable, roasting in front of a fire.

The Effects of Preservatives on Tubercle Bacilli.

(1) Forster sprinkled pure cultures of tubercle bacilli with sterilized common salt and found them virulent two months later. (2) He found, also, that finely minced tuberculous organs, after lying in salt brine for eighteen days, retained their virulence. (3) That salting and subsequent smoking did not render tuberculous organs innocuous unless these be smoked for three to five hours on three different occasions, or after smoking be kept in a dry room for one or two months.

The Effects of Digestion on Tubercle Bacilli.

The gastric juice, being acid, has no doubt a retarding influence on the growth of tubercle bacilli, but it is not, during digestion, in contact sufficiently long to destroy them.

Falk and Weseuer exposed tuberculous material to artificial gastric juice for some hours, but it was still virulent when tested by the inoculation of animals.

Strauss and Wartz showed that six hours in the gastric juice of a dog did not destroy the vitality of tubercle bacilli, but that twenty-four hours were needed. (During the process of digestion three or four hours is probably the longest time any portion of a meal will remain in the human stomach, and much of the food will pass out in a shorter time.) Newsholme suggests that the fatty envelope of tubercle bacilli would probably be dissolved easier in the stomach than under artificial

conditions, as the fat-splitting enzyme of the gastric juice is very sensitive to its environment.

Stern has demonstrated that the intestinal juice has no effect on tubercle bacilli.

We may, therefore, safely consider (1) that digestion, or salting, or smoking (as usually carried out) has little or no disinfecting effect on tuberculous meat; (2) that owing to the rarity of tuberculous foci in the flesh, even in its most advanced cases of tuberculosis, ordinary cooking is sufficient, as, with the exception of contaminated "butcher rolls," contaminated meat is thus rendered innocuous.

With a more efficient "meat inspection" the quantity of tuberculous organs reaching the market would be reduced to a minimum.

We may justly infer, therefore, that to the community at large the risk of contracting tuberculosis by eating the meat of tuberculous animals is not so great as is generally believed; but that this risk is greater than it should be, owing to inefficient methods of inspection. This imperfect inspection particularly concerns those that buy cheap meat and eat such commonly infected organs as the lungs, udder, and mesenteries.

Personal.

Dr. Squire Sprigge, who has been chief of the editorial staff of the *Lancet* for fifteen years, has been formally appointed editor.

UNIVERSITY OF LONDON.

The following have been appointed as Examiners in the Faculty of Science (Veterinary Science) for internal students for 1909:—

Intermediate Examination.

Veterinary Anatomy.

E. S. Shave (Royal Veterinary College), together with the External Examiner.

Veterinary Physiology.

G. A. Buckmaster (University College and Royal Veterinary College), together with the External Examiner.

Final Examination.

Veterinary Hygiene.

G. H. Wooldridge (Royal Veterinary College), together with the External Examiner.

Veterinary Pathology.

Sir John McFadyean (Royal Veterinary College), together with the External Examiner.

Zoology.

H. W. M. Tims (Royal Veterinary College), together with the External Examiner.

The list of External Examiners was published in the Veterinary Journal for April.

Clinical Articles.

INGUINAL HERNIA OF GRAVID UTERUS IN A BITCH.

BY GEO. H. WOOLDRIDGE, F.R.C.V.S., M.R.I.A., PROFESSOR IN THE ROYAL VETERINARY COLLEGE, LONDON.

THE subject of this note was a pregnant toy Yorkshire terrier bitch, whose period of pregnancy had lasted ninety-seven days. She had been showing uneasiness and intermittent pains resembling labour pains for two days. A swelling had been noticed in the left groin for some weeks, and it had gradually grown larger. During the last fortnight it had been rather more swollen and painful. Examination readily revealed the fact that the swelling was very painful and due to a herniated gravid uterus containing a single fœtus. As the owner desired the dog simply as a pet, and preferred she should not run this risk any more, it was decided to perform hysterectomy through the hernia sac. Accordingly, morphine tart. gr. ss. (inject. morph. B.P. m.x.) was administered subcutaneously in the back. The patient vomited three minutes later, and in little over half an hour she was quite sleepy and was put on the table, and the operation area washed and denuded of hair. A few whiffs of chloroform were then administered, and she was very quickly under its effects without any preliminary excitement.

The operation was then rapidly proceeded with, the body of the uterus being easily drawn into the hernial sac and a transfixing ligature applied as far back as possible and a simple one a little more forward. The body was then cut through with a scalpel, the stump being retained by artery forceps for a few seconds to be mopped with an antiseptic. The ovary of the same side was next secured, a ligature being placed above. The ovary of the other side could not be drawn into the sac, so a ligature was placed as high as possible up the uterus horn and the latter severed. The pregnant uterus, which proved to contain a single very large fœtus, was immediately handed to an assistant to open, with a view to saving the puppy if possible. The latter, however, on being released, appeared to have been dead some time. While the uterus was being removed, bowel was constantly getting in the way and having to be replaced. A series of half a dozen sutures was next inserted in the hernia ring, and then the peritoneal layer of the sac was dissected from the other layers, and the edges being well held up by forceps, a transfixing ligature applied as near to the already inserted sutures as possible: the sac was then cut off close to the ligature. I may here note that this line of procedure is not the usual one, and I confess that it was not quite what I intended to do. The sac should have been ligatured first and returned to the abdominal cavity and then the ring sutured. This necessitated another row of buried sutures to enclose the stump of the sac, and then the skin was sutured; the wound thoroughly dried with ether and sealed with flexile collodion.

All went well for four days, when a swelilng occurred in the sac, and on the fifth day the skin sutures were removed and a quantity of thick, creamy, blood-streaked material was pressed out. The cavity was irrigated with 2½ per cent. carbolic, and an apron bandage applied. Daily dressings with chinosol 1 in 500, and followed by dry acid.

borici, brought the case to a successful issue. The creamy material was examined bacteriologically, and no organisms could be detected. I am of opinion that it was due to disintegration of the stump of the hernia sac and invasion by leucocytes. Ligatures and suture material throughout consisted of fine Chinese silk twist, and swabs for mopping during the operation were boiled absorbent cotton wool lying in 2½ per cent. carbol. sol., and well squeezed before being applied in order to avoid carbolic acid poisoning.

In the VETERINARY JOURNAL for June, 1908, I recorded a similar case to this, occurring in a black and tan wire-haired terrier. In this case, however, the bitch was brought in during the seventh week of pregnancy, operation being followed by very rapid and uneventful recovery.

AN INTERESTING CASE OF HARE LIP AND CLEFT PALATE NOT DUE TO IN-BREEDING.

BY FREDK. HOBDAY, F.R.C.V.S., F.R.S.E., KENSINGTON, W.

CLEFT palate and hare lip are very frequently met with in the same patient, or may be met with separately, and in canine patients they are conditions very commonly seen in the newly born puppies of certain breeds, especially bulldogs, griffons, Japanese, Blenheim, and King Charles spaniels, and others of the short-nosed and flat-skull varieties. In bulldog litters it is no uncommon thing to find 40 per cent. of the litter with one or other of these defects, and more than once I have seen every puppy so affected.

Usually, I believe, it is taught that in-and-in-breeding has been responsible for the deformity; but although there may or may not be something in this as a cause, I am quite sure it is not *the* cause. Often and often have I traced back the pedigrees and found no trace whatever of kinship between the sire and dam; but the following case was the most direct contradiction I have ever met to this theory: The dam was a toy Yorkshire terrier and the sire a very small Aberdeen, the result of the mating being three tiny puppies, two of which had a well-marked hare lip and cleft palate, so much so that they could not suck at all, and had to be destroyed.

It certainly seems a curious fact that these defects, although by no means entirely confined to the short-nosed varieties of dogs, are very much more frequent in them than in the long-nosed breeds. I know, of course, that it is also met with in the cat, in foals, and in calves, and also, doubtless, in other species of the domesticated animal

---

THE USE OF IODINE ON THE SKIN AS AN ANTISEPTIC IN SURGICAL WORK.

BY GUY SUTTON, M.R.C.V.S., KENSINGTON, W.

A REPORT on the efficacy of tincture of iodine as an agent for sterilizing the unwashed skin previous to operation was published in the *British Medical Journal* in the early autumn of 1908. Its simplicity of application so impressed me that I determined to give it a trial in

the many and varied operations that the town practitioner in veterinary surgery is called upon to perform.

During the last three or four years, in cases of pleurisy with effusion, both in horses and dogs, I have always painted the chest wall with the tincture previously to making an exploratory puncture. In many cases several applications, extending over three or four days, have been made, the iodine being prescribed primally as an absorbent. With this procedure twenty cases of parancentesis have been observed since 1906. The usual precautions of boiling the canula and trocar, clipping the hair, and washing with soap immediately prior to puncture, have also been taken, and in no case has suppuration supervened. These precautions have also been taken before puncture for the relief of flatulent colic. During the last nine months I have used it regularly. In over twenty neurectomies, both median, ulnar and plantar, a wide area has been painted previous to the horse being cast. When under chloroform the hair has been shaved and the part douched with 2½ per cent. carbolic solution. Instruments have been boiled and ordinary personal cleanliness observed, and I confidently assert that the addition of iodine painting to the two latter items increased the percentage of healing by primary union.

In two cases of castration of aged stallions with the actual cautery the scrotum has been simply widely painted with the undiluted tincture previous to incision, and in both instances the horse has been at work within two days, and suppuration has been reduced to a minimum.

Several dogs, both large and small, have been castrated by means of ligature, the scrotum being first painted with iodine, and with the usual precautions of cleanliness and sterilization of instruments, asepsis has been the rule. The same may be said of its use in the removal of numerous small superficial tumours.

In the cat, especially the long-haired breeds, castration, even with ordinary precautions, is occasionally followed by an active suppuration, often with fatal results. For some time, in addition to boiling the scalpel, I have painted the scrotum with a 1 in 4 solution after removing the hair with scissors. This absolutely saturates the skin, which is doubtful when the ordinary watery solutions of mild antiseptics are used.

In the horse I have also used the undiluted tincture after suturing torn eyelids, nostrils, and small lacerated wounds, painting it on to the exposed silk and surrounding areas. It does not appear to irritate excessively, and suppuration is infrequent.

I have not yet tried the efficacy of this procedure in abdominal surgery, for in all major operations one is naturally loth to leave any loophole for infection.

All practitioners readily admit that asepsis is difficult to attain in veterinary practice. My recent experience has made me a warm advocate for the application of tincture of iodine. It is easy of application, occupying only a few seconds, is inexpensive, not violently irritant, and, I believe, highly efficient.

SARCOMA OF THE TARSUS OF A DOG, WITH SECONDARY INFECTION.

BY J. A. GILRUTH, M.R.C.V.S., F.R.S.E., AND C. J. REAKES, M.R.C.V.S., NEW ZEALAND.

(*From their Annual Report for* 1907.)

THE case was a pure-bred St. Bernard dog brought to the laboratory for examination.

There was a considerable swelling affecting the right tarsal joint, and apparently implicating the tibia above. There was no history of a previous injury, the swelling having been only observed as a result of the lameness exhibited; but on account of the pain manifested, and also the seat of the swelling, the case was diagnosed as one arising from injury. Two days later, however, the animal was found dead. On *post-mortem* the lungs were distinctly emphysematous, with pigmentation of the interlobular septæ. The heart was enlarged. The liver was congested, and underneath the capsule—but widely separated from each other—were two nodules, homogeneous and circumscribed, one being the size of a marble, the other the size of a split-pea. The kidneys were congested and showed punctiform hæmorrhages, and the bladder was distended with urine. The muscles of the right posterior limb were greatly atrophied. Implicating almost the whole of the right tarsus, but especially the inner aspect, was a mass of apparently new growth, fairly dense in consistency, with calcareous points here and there. This growth had caused absorption of much of the bone of the region, and was invading the lower extremity of the tibia. Sections examined microscopically demonstrated the new growth of the tarsus to be of the nature of a round-celled sarcoma. There were numerous newly-formed blood-vessels, and a number of small hæmorrhagic areas throughout. The remains of the original bone consisted only of small irregular spicules here and there.

The nodules of the liver were demonstrated to be distinctly secondary, being composed of small round cells with numerous delicate newly-formed blood-vessels.

The kidneys contained numerous small hæmorrhagic areas; the blood-vessels were congested, while the malpighian corpuscles were considerably enlarged.

GENERALIZED SARCOMATA IN A MERINO WETHER.

BY J. A. GILRUTH, M.R.C.V.S., F.R.S.E., AND C. J. REAKES, M.R.C.V.S., NEW ZEALAND.

(*From their Annual Report for* 1907.)

SPECIMENS of a very interesting case were forwarded by Mr. T. Anderson, Assistant Meat Inspector.

The wether was one of a mob sent in the ordinary course for slaughter for human consumption, and in life it did not exhibit any abnormality. After slaughter, however, the peculiar appearance of the muscles commanded attention. Throughout the whole of the intermuscular tissue of the body were present large numbers of smooth tumours with circumscribed edges, generally flattened, more or less oval, and varying from the size of a pea to that of a marble. These

tumours were not confined to the intermuscular tissue, although there they predominated. They were also present within the muscles, the heart itself being affected with a number of very small tumours lying between the bundles of muscle-fibre. On the peritoneal surface of the diaphragm a number were present, situated between the visceral and parietal folds of the peritoneum, and distinctly flattened.

On section these tumours were found to be homogeneous, whitish, and soft, but the larger ones contained small areas of granular degeneration. Sections examined under the microscope demonstrated the growth to consist of typical round cells composed almost entirely of nuclei, with but little surrounding protoplasm, and numerous new blood-vessels. Sections of muscle, both somatic and cardiac, demonstrated under the microscope the new cells invading the spaces between the muscle-fibre in the manner characteristic of a rapidly growing round-celled sarcoma.

Although careful search was made for the presence of a micro-organism, none could be detected.

SARCOMA AFFECTING THE FEMUR OF A WETHER SHEEP.

BY J. A. GILRUTH, M.R.C.V.S., F.R.S.E., AND C. J. REAKES, M.R.C.V.S., NEW ZEALAND.

(*From their Annual Report for* 1907.)

SPECIMEN received from Stock-inspector Brittain. The history was meagre, it being supposed that the animal had broken the leg.

On *post-mortem* the bone was found degenerated and soft. To the naked eye the specimen seemed to consist of a mass of some kind of bony tissue infiltrated with blood, and a mass of black very friable material. Sections examined microscopically demonstrated the presence of a melanotic sarcoma invading the bony tissue. The major portion of the new growth consisted of tissue so impregnated with melanin as to render it impossible to determine the nature and contour of the cells with any degree of exactitude, but the most recent portions consisted of round and irregular cells, many even of which displayed the presence of granules.

"NERVOUS," "STIFF-LEGGED," OR "FAINTING" GOATS.

BY DRS. GEO. R. WHITE AND JOSEPH PLASKETT, NASHVILLE, TENNESSEE.

SEVERAL months ago we were called to the well-known Ewell Stock Farm, Spring Hill, Maury County, Tennessee, to see the famous pacing stallion, John R. Gentry. While there, our attention was called by the proprietor, Mr. George Campbell Brown, to a peculiar breed, or species, of goat, known throughout this section as "Nervous," "Stiff-legged," or "Fainting" goats.

We had often before heard of such animals, but up to that day had considered it either a joke or superstition. However, upon this

occasion we were convinced beyond the shadow of a doubt that such goats do exist, as their owner required them to "perform" for our special benefit. So much interested were we in their behaviour that Mr. Brown, upon our request, shipped to us by express a pair, in in order that we might acquaint ourselves more fully with them. These goats have been kept in a box-stall of the Nashville Veterinary Hospital for the past six months, which has afforded an excellent opportunity to observe their behaviour.

After careful observation and painstaking investigation, we are convinced that this is a new breed of goat, worthy of note. The history of this unique goat is somewhat indefinite, and as to how they exactly originated we are not certain. However, so far as we have been able to determine, the breed was first seen in the south-eastern part of Marshall County, Tennessee. At the present time there are a few of these goats distributed over Marshall, Giles, Lawrence, Maury, and Coffee Counties. Mr. George Campbell Brown has a herd of thirty-five. We do not believe there are more than seventy-five or one hundred of these goats in existence at the present time.

At a casual glance under ordinary conditions they appear to be just ordinary "billies," but upon the least excitement the picture changes. Closer acquaintance reveals the fact that they possess a most extraordinary characteristic. They are easily frightened, and to simply "boo" at them will cause them to fall helplessly to the ground and remain there until the spell leaves them. They scare and faint upon the slightest provocation. The mere effect of jumping over a fence or bar over 15 or 18 in. from the ground is sufficient to cause them to become stiff and "faint."

When under these spells they can be approached, turned over, and dragged about just as if they were dead. They become so rigid and stiff that they can be lifted bodily without bending. So far as we have been able to determine, the animal retains full possession of its intellectual faculties throughout this peculiar manœuvre, but they have that pathognomonic expression indicative of fright, anxiety, and, we might say, agony. The symptoms simulate those of tetanus or strychnine poison. They become stiff and rigid, totter and fall to the ground in tetanic convulsions, the duration of which varies from ten to twenty seconds. At this time there is protrusion of the eyeballs, which gives them a "bucking," wild, staring appearance. Associated with the above we have general rigidity of all the voluntary muscles. Contraction of the cervical extensors causes a straightening of the head, hardness of the muscles of the neck to the touch. Upon the back, loin, and croup the muscles are as hard as wood. On account of the spasmodic contraction of the muscles of their legs, their flexion is impossible.

Dyspnœa in an aggravated form occurs; in fact, on several occasions we have noticed temporary cessation of respiration entirely, on account of intense rigidity of the abdominal and thoracic muscles, associated with fixation of the diaphragm and spasm of the glottis. The heart muscle, although it is involuntary in character, must certainly respond in some manner to the same stimulus of excitement which affects the voluntary muscles, as the pulsations during the attack are fast, hard, small, and irregular. The animals lie on their side for

fifteen or twenty seconds in a state of opisthotonos before recovering sufficiently to again rise to their feet. After getting up they stagger and walk off with their legs stiff, rigid, and spread wide apart. The gait at this time resembles that of a horse suffering with tetanus; after they have gone twenty or thirty feet the symptoms disappear, and they have the appearance of an ordinary goat, none the worse for the ordeal through which they have gone. It is said that, in rare cases, these goats have been known to be frightened to death; this is very rare, however.

At this juncture we will state that a kid has been born since these goats have been under our observation, and it presented all the characteristic "nervous" and "fainting" symptoms of its parents before it was three hours old.

The histological and anatomical changes in the motor nerve centres and trunks we are not in a position to explain, as such would be impossible in the absence of an autopsy. The excitement causes over-stimulation of the motor nerve tracts, which, after fifteen or twenty seconds, subsides into the normal condition.

The reasons for such a peculiarly high developed nervo-muscular system we shall not attempt to explain; suffice it to say that this trait of action has become so well marked, and so thoroughly established, that we are justified in classing this animal as a new, separate, and distinct breed, since uniformity has been established; the general principle that "like produces like" holds good with this breed.

It has long been an axiom that the physical as well as the mental and moral peculiarities of the father and mother are visited upon their children, even beyond the third and fourth generations, so it is that this established characteristic is uniformly transmitted by heredity from the father and mother goats to their offspring.

After most diligent inquiry we are unable to trace a single case where atavism has taken place.

The advantages of this goat over the common goat is that it can be kept in prescribed grounds.

TICKS ON DOGS.

VALUABLE dogs are often killed owing to the attacks of scrub (not cattle) ticks. If the ticks are promptly removed a dog will usually recover, but if they are not detected the animal rarely survives. In the case of woolly-haired dogs the insects are difficult to find, in which case the dog may be sheared and the ticks removed. They should not be forcibly pulled off, as the mandibles are invariably left in the animal's skin, and the mischief goes on. Insects breathe through their bodies, hence, if the pores are closed by the application of oil, turpentine, or kerosene, the tick dies, and may be extracted entirely. If the ticks cannot be found, the following dressing will be of some service: Soft soap, 4 oz.; kerosene, 1 teacupful; water, 1 quart. Boil the soap and water together until the soap is dissolved. When cool, add the kerosene, and agitate the mixture thoroughly for five minutes with a rod. Wash the dog all over with some of this mixture. Give internally 3 to 10 grains of iodide of potassium in two tablespoonfuls of water.—*Queensland Agricultural Journal.*

Abstracts and Reports.

FARMERS AND CAVALRY HORSES.—MR. HALDANE'S SCHEME TO BE TRIED AT NORWICH.

"To the Editor.

"SIR,—As foreshadowed in Mr. Haldane's speech on the Army Estimates, it has been decided to make a trial of a scheme of boarding-out Government horses, with a view of providing a reserve of trained horses for the Cavalry in the event of mobilization. The scheme is on similar lines to one which has proved successful in Austria-Hungary.

"The regiment under my command (19th Hussars) has been directed to carry out the experiment in the neighbourhood of Norwich. Below will be found the conditions framed by the War Office under which horses will be boarded out.

"It has been thought advisable to obtain the services of a committee of well-known local gentlemen to assist the commanding officer (at Norwich for the time being):—

"(1) In selecting suitable persons from the list of applicants.

"(2) In assisting him to come to a decision in case of any dispute arising over condition (*e*).

"The Right Hon. Ailwyn Fellowes has kindly consented to act as President of this committee, and R. Cooke, Esq., M.S.H.; Albert Collison, Esq., Mitcham, Swaffham; and C. D. Seymour, Esq., Barwick, Stanhoe, have consented to become members of it.

"In case there should be more suitable applicants than there are horses to issue, lots will be drawn to decide who shall have them.

"I am instructed by the War Office to make a trial of the scheme in Norfolk with twenty-five horses only to begin with, and if there appears to be a sufficient demand by responsible persons to increase it to the full fifty alluded to in the War Office conditions below.

"Applications for allotment of horses should be addressed to the commanding officer, 19th Hussars, Norwich. Applicants before being allotted horses will be required to sign an undertaking to abide by the Government conditions.

"I shall be very pleased to see anyone interested in the matter at the Cavalry Barracks, and afford any further explanations they may require, and show them the class of horses that will be let out under the scheme. Unless an appointment is made the most convenient hours are between 11 a.m. and 1 p.m. daily.

"The horses will be thoroughly broken, quiet riding horses, and can be trained for harness in barracks if desired before issue.—I have the honour to be, Sir, your obedient servant,

"(Signed)

"PHILIP W. CHETWODE, Lieutenant-Colonel,

"commanding 19th (Q.A.O.R.) Hussars.

"Norwich, *April* 13.

"Conditions under which horses will be sent to farmers, &c.:—

"(*a*) That they should be properly fed and cared for.

"(*b*) That they shall be suitably shod.

"(*c*) That they shall not be used for carting heavy loads or for ploughing, and shall not be let out on hire.

"(*d*) That they shall at all times be liable to inspection by the Remount Department, the officer commanding the regiment, or an officer deputed by him, and shall be liable to be at once returned to the regiment, if in the opinion of the officer commanding they have not received proper treatment.

"(*e*) That in case of death or injury to the horse, due to proved neglect or improper treatment, the allottee shall agree to be liable to pay such compensation as may be fixed by the Army Council. This can be met by user insuring the horse.

"(*f*) That they are to be at the disposal of the regiment for three weeks or a month each year for training when required, subject to reasonable notice being given.

"(*g*) That they shall be liable to be claimed by the regiment at any time for mobilization. That when the horse would in ordinary circumstances be cast, the user shall become its owner.

"(*h*) The horse will not be permanently withdrawn except on mobilization, or on account of misusage or neglect on the part of the user, or in the event of the horse dying or having to be destroyed."

(*Eastern Daily Press.*)

THE PRESENT POSITION OF CHEMO-THERAPY.[1]

BY G. D. LANDER, D.SC., F.I.C., PROFESSOR IN THE ROYAL VETERINARY COLLEGE, LONDON.

THIS lecture gives an interesting summary of the general problems of chemo-therapy, more particularly in reference to the treatment of trypanosomiasis by chemical agents—arsenicals and dye-stuffs—many of the advances dealt with being the results of Ehrlich's own experimental work. "Atoxyl" is the sodium salt of *para*-aminophenyl arsenic acid, and has the constitution $NH_2C_6H_4AsO(OH)(ONa)$.

It will be seen that it is derived from arsenic acid, $AsO(OH)_3$, by the replacement of the aminophenyl (aniline) group for one OH group of the acid, and it is further to be noted that is a derivative of pentavalent arsenic.

By reason of the great reactivity of the NH_2 group when conjoined to a benzene ring, it is possible to prepare numerous derivatives of atoxyl. For example, the acetyl compound $CH_3CONHC_6H_4AsO(OH)(ONa)$, analogous to acetanilide ($CH_3CONHC_6H_5$), and phenacetin ($CH_3CONHC_6H_5$). The compounds $OHC_6H_4AsO(OH)(ONa)$, *para*-oxyphenyl arsenic acid, and $COOHCH_2NHC_6H_4AsO(OH)(ONa)$, *para*-glycinophenyl arsenic acid, among many others, have also been prepared.

The variations in toxicity and trypanosomicidal power are very great; thus the acetyl compound is three to ten times less poisonous than atoxyl, and by reason of this is a better therapeutic agent.

It is remarkable that these compounds, derived from pentavalent

[1] Abstracted from a lecture delivered by Ehrlich before the German Chemical Society, October 31, 1908.

arsenic, are not toxic to the tryponosomes *in vitro*, a fact which leads to the conclusion that they must be modified in the system of the host, in some such way as to activate them, and in consideration of the general features of chemical reactions *in vivo* it appears likely that this modification may take the form of reduction of the arsenic from the pentavalent to the trivalent state.

By chemical reduction *in vitro* atoxyl and its congeners may be transformed to this trivalent type, and mention may be made of the compounds $NH_2C_6H_4As{:}O$ and $NH_2C_6H_4As{:}AsC_6H_4NH_2$ in which the NH_2 group[2] may be replaced as above indicated.

These artificial reduction compounds actually are capable of destroying trypanosomes *in vitro*, the activity being in some instances multiplied by 100,000 in virtue of the change of valency of arsenic from five to three, and it is also proved that the activity of the original arsenicals is due to body reduction.

As regards the mechanism of the attack by the drug, Ehrlich postulates the existence of chemical groups in the protoplasm capable of fixing or "anchoring" the arsenical, and calls them chemoceptors (arsenoceptors, &c.) on the analogy of the receptors of his immunity side-chain theory.

It is further possible to obtain races of trypanosomes tolerant (or immune) to drugs, which Ehrlich explains as due to a weakening of their chemoceptors, such as to cause a preferential fixation of the drug by the experimental animal, since the tolerant races do not resist the action of the drug *in vitro*. The tolerance is an hereditary quality, withstanding, for example, 350 passages through normal mice. It is also specific. Tolerance against atoxyl derivatives is no protection against fuchsin (a triphenylmethane dye-stuff), nor is tolerance to either of these a protection against the dye-stuff trypane-red.

The tolerance, however, extends to closely allied representatives of each type, and the three groups, fuchsin, trypane-red, arsenicals, thus form a "therapeutic sieve," rendering it possible to classify a given tolerant race.

It is noteworthy that arsenical tolerance may be extended to the allied agent, antimony, whose trypanosomicidal activity was observed by Plimmer, but not to arsenious acid itself.

From the practical standpoint it is also interesting to note that good results have been obtained with horses and dogs by means of the compound $COOHCH_2NH_6H_4As{:}O$, arseno-phenylglycine.

The points specially brought out may be summarized:—

(1) The lethal action of the arsenical drugs is greater with trivalent than with pentavalent arsenic compounds.

(2) Reduction of the atoxyl compounds from pentavalent to trivalent almost certainly occurs in the body.

(3) The drugs "anchor" to this organism by means of "chemoceptors," and when these are weakened, as in the tolerant races, are fixed mainly by the body cells, thus losing their trypanosomicidal power.

(4) There are specific "chemoceptors," *e.g.*, to arsenic, triphenylmethane dyes, and azo-dyes. Thus tolerance to one class does not imply tolerance to the others.

[2] This type is the arsenic analogue of the azo-dyes derived from $C_6H_5N{:}NC_6H_5$.

FURTHER INVESTIGATIONS INTO THE DISEASE CAUSED BY PIROPLASMA MUTANS.[1]

BY DR. A. THEILER, C.M.G., VETERINARY BACTERIOLOGIST TO THE TRANSVAAL GOVERNMENT.

In the last annual report I demonstrated the duality of two piroplasms, namely, Piroplasma bigeminum, the cause of redwater, and Piroplasma mutans, which, in my opinion, is the cause of one of the forms of the disease known as gall-sickness. I also pointed out the difference between the two infections, and the difficulty which occasionally presents itself in differentiating between this new piroplasma and the Piroplasma parvum of East Coast fever. This is more particularly the case in smears of an animal in the initial or middle stage of an East Coast fever infection at a time when Piroplasma parvum is not present in sufficient numbers to allow of a conclusive diagnosis. Reference was made to the importance Piroplasma mutans is assuming, and I only need refer to the tabulated form of the summary of microscopical and pathological anatomical examinations, when it will be seen that in twenty-four instances during the year the diagnosis of Piroplasma mutans was made, and in two instances the diagnosis had to be left open, as no definite opinion could be formed as to whether Piroplasma parvum was present or not. We observed some very striking instances of cattle dying with an accompanying infection of Piroplasma mutans. In one case the examination of smears which were obtained from dead cattle led, in the first instance, to some doubt as to the true nature of the disease, but when the history came to hand only the one interpretation was possible, that it was not a case of an East Coast fever infection but of Piroplasma mutans. This particular instance was noticed in Nelspruit, on the very farm on which our previous experiments had been made with East Coast fever in 1903; this farm had been proved at one time to have become free of East Coast fever, and the same cattle which were exposed there had been running together with their progeny for the last four years. Early in 1908 the proprietor imported from the high veld a number of calves, and, within a short time after their arrival, they contracted a disease and rapidly died off. Smears, which were forwarded to the laboratory, showed in the majority of cases small bacillary forms, which we were first of all inclined to regard as Piroplasma parvum. This, however, had to be excluded by reason of the previous history, and the conclusion finally arrived at, namely, that the disease had nothing to do with East Coast fever, was proved by the subsequent history, when the remainder of the sick cattle recovered and no more outbreaks were noted.

This practical observation of the influence of Piroplasma mutans on cattle freshly imported into the low veld, induced me to see whether cattle which were immunized against redwater and Piroplasma mutans would resist the disease on this particular place, and should this be so, we would then be able to restock the low veld with high veld cattle after they had been injected with redwater and Piroplasma mutans. Altogether eighteen head of cattle were exposed, being animals varying

[1] This article and those following by Dr. Theiler are abstracted from his Annual Report to the Transvaal Department of Agriculture.

from one to three years, both heifers and oxen; they had been in previous experiments with a Piroplasma mutans infection, and all showed at one time or another Piroplasma bigeminum or mutans in their blood. Together with these eighteen immunized animals, two controls were exposed which in no way previously had been injected, and were susceptible to both piroplasms. Soon after their arrival in Nelspruit, the two controls showed a fever reaction, and the blood was immediately examined. It is a noteworthy fact that in both instances Piroplasma mutans appeared before Piroplasma bigeminum, in the one animal on the eighteenth day, and in the other on the nineteeth day; both animals died, the former on the twenty-first to twenty-second day, and the latter on the twenty-sixth day. It was only in this latter one that an infection with Piroplasma bigeminum was found, and this appeared two days previous to death. The Piroplasma mutans infection must have been the primary one, as proved by the fact that the injection of blood obtained on the date when Piroplasma mutans was diagnosed into susceptible animals caused a pure infection of Piroplasma mutans, and in this way for the first time the fact was established that Piroplasma mutans can be separated from Piroplasma bigeminum. The *post-mortem* examinations of these animals, were, however, in no way decisive, the lesions pointing to heartwater being a complication of the disease.

Of the eighteen immunized animals two died, one on the nineteenth day and the other on the fourteenth day after exposure. The illness lasted for six days in both cases, and during this time Piroplasma mutans could be observed, but the lesions shown on *post-mortem* examination were absolutely typical for heartwater. Of the remaing sixteen animals, six showed a distinct fever reaction; the incubation time corresponded to that observed before in heartwater, and during this time Piroplasma mutans was observed in every instance. In some animals a prolonged fever reaction was apparent, and they all showed considerable loss in condition, but eventually recovered. Notwithstanding the presence of Piroplasma mutans, I do not consider this reaction as being due to Piroplasma mutans, but to heartwater, and this opinion is supported by a subsequent experiment, when blood obtained from one of these beasts at the time of the reaction was forwarded to Pretoria and injected into a goat, causing death from heartwater. The remaining ten animals showed all more or less fever reactions at about the time typical for heartwater; they all recovered, and apparently did not suffer much from the attack. As stated above, the control animals contracted Piroplasma mutans; they did not die as a result of this infection but of heartwater. It can safely be concluded that the mutans infection had not sufficiently developed to cause death, when the heartwater intercepted, and was responsible for the fatal issue. In the case of the immunized animals, the appearance of Piroplasma mutans was also due to a heartwater infection, this reaction probably causing a revival of the latent infection of Piroplasma mutans when the parasites increased in numbers. A similar observation has already been made in the annual report for 1903-04, p. 123, when an animal immune against redwater, and what is now called Piroplasma mutans, was injected with blood from a sheep affected with heartwater; a typical heartwater reaction followed, during which Piroplasma mutans became very frequent.

The practical interpretation of this observation is that although Piroplasma mutans may be seen in smears, yet, unless every other cause can be excluded, it cannot safely be said that the animal is suffering at that particular time from Piroplasma mutans, and should it die that the cause of death is this form of gall-sickness. For instance, in an infection with heartwater, complicated with Piroplasma mutans, the former cannot be determined from a microscopical examination alone owing to its cause being ultra-visible; in fact any disease with a high fever reaction may be responsible for the appearance of Piroplasma mutans in an animal immune against this parasite.

I have mentioned that in practice the presence of small piroplasms does not always permit of a certain diagnosis, and in such cases a further supply of smears is necessary, taken several days later, when in the case of East Coast fever, the piroplasms will have increased, and the point can be settled. In order to obviate this difficulty, which was intensified if such animals died before a sufficient supply of smears were obtained, another means of substantiating the diagnosis microscopically had to be found. In his publication in the *Cape Agricultural Journal*, in 1903, on East Coast fever, Professor Koch mentioned the presence of peculiar bodies in the internal organs of animals infected with this disease, and when these bodies were stained according to the usual protozoic formula, they assumed a bluish colour, showing a number of chromatine nuclei apparently resembling small piroplasms. The nature of these bodies, which are now known as "Koch's granules," is not yet determined. By corroborating the above and by killing an animal at the height of an infection of Piroplasma mutans, I have been able to convince myself that although these plasma bodies are invariably present in the spleens of animals infected with East Coast fever, they do not appear in an infection of Piroplasma mutans. A similar observation has also been made by other investigators, principally Lichtenheld, of Dar-es-salem. All the Government veterinary surgeons have been notified to this effect, and instructed that in cases of doubtful East Coast fever, to not only send in smears of blood but also from the spleen. For some time past this has been carried out by our officials, and also to a large extent by the police, and the advantages have been proved in several instances where otherwise doubts would have existed.

The necessity has naturally arisen for a better means of differentiating between Piroplasma parvum and Piroplasma mutans, and it is my intention to detail one of my assistants for this purpose in order to arrive at some practical points which would guide us in future.

Furthermore, as I have pointed out in these notes, having arrived at a pure infection of Piroplasma mutans, it is now possible to make further experiments to elucidate the course of that infection, and as the disease is undoubtedly tick-borne, it will be necessary to undertake that study of the question as well. All these experiments I propose to undertake during the ensuing year.

Finally, the experiment with the cattle in the low veld has further proved the prevalence of heartwater there, and the difficulty of introducing stock with safety; it has demonstreted the necessity for continuing our experiments into heartwater; but since this disease is carried by ticks and there is but little hope of eradication of the ticks in the low veld by dipping, the only practical way will be

a method of immunization. Farmers in the low veld are clamouring for assistance, as heartwater prevents them from improving their stock by breeding with imported animals, and it is with regret that I do not see any possibility of undertaking these experiments during the next year, in view of the attention required by two equally important ravages to which I shall refer later.

INVESTIGATIONS INTO EAST COAST FEVER.

BY DR A. THEILER.

THE experiments with East Coast fever were continued during the year under review, and I must confess, reluctantly, that owing to lack of facilities for properly securing animals in our Experimental Station at Daspoort, and the fact that we were living in the midst of absolutely clean district surrounded by clean cattle, the investigation had to be very limited. Had it not been for the purpose of finding a way, other than by tick infestation, of transmitting the disease from a sick to a healthy animal, I would not have undertaken any further experiments, but this is the main object I have in view, and should I be able to solve the difficulty hopes could then be entertained of a preventive inoculation. It is unnecessary to enumerate all these experiments in detail; they were very numerous, and all failed. No liquid or substance of a sick animal kept at the incubation temperature or in the ice-box for periods varying from days to weeks produced the disease in the injected animals. Experiments were also made with ticks which were conclusively proved to be infected; they were then macerated, mixed with physiological water, to a fine emulsion, and injected again with negative results. When tested later with infected ticks, the animals contracted the disease and died. Maceration of healthy ticks was made and added to infected blood; some of the emulsion was kept at normal and the remainder at blood temperature for days; the injection again gave negative results. Blood was transfused from sick to healthy animals in enormous quantities, and no disease ensued. The red corpuscles were broken either with hæmolytic sera or with other material acting with hæmolysines; the residue was collected and injected and no results were given. Although these experiments are very disappointing and discouraging, yet I do not consider myself justified in making a statement that the disease is not transmissible in any other way than by ticks, but wish to repeat the experiments in the new laboratory, where we shall have better facilities for this purpose.

In connection with these experiments others were continued for the purpose of finding why East Coast fever when introduced in the high veld as a rule dies out shortly after. You are probably aware that at the beginning of the epidemic East Coast fever was introduced into various places in the high veld, and it was noted that in contrast to the low veld experience, healthy cattle arriving in the high veld survived notwithstanding the previous introduction of East Coast fever. No fresh outbreaks were noticed, the animals remained healthy, and the disease did not spread.

At that time we did not know that the red tick was a carrier of

East Coast fever, and the high veld experience was apparently explained by the fact that the brown tick (which is the principal carrier of the disease) was not found amongst the surviving cattle at the time the examination was made, and it was therefore concluded that the brown tick could not live in the high veld. Later investigations, however, proved that the brown tick may live in protected places (for instance, dongas) in very high altitudes, but it is not present in large numbers. In 1906, Lounsbury, of the Cape, stated that the red tick was also a carrier of the disease, and as mentioned in the last report I was able to corroborate this statement, with the reservation that the red tick is not such an unfailing carrier of piroplasma parvum as the brown tick. A factor of the high veld suggested itself as an explanation, namely, the influence of the cold, and to which the farmers ascribed the absence of the disease.

I decided to experiment on these lines by exposing ticks of which I first of all proved that they were infected with East Coast fever; they were then exposed to varying degrees of cold and for different periods. The results of these experiments were that (1) a temperature o C. retards the hatching of brown ticks into adults; (2) a temperature of o C. does not interfere with the development of the parasite within the engorged nymphæ; (3) a temperature of o C. does not kill the virus contained in engorged nymphæ of the brown tick. In no instance was any difference noted in the virulence of the disease; the only point of interest was that the ticks kept at a low temperature moulted at a later date than the controls, but when the former were placed on susceptible cattle these animals promptly contracted the disease and died.

In the light of this experience the conclusion might be drawn that it is not the cold which interferes with the development of the parasites in the tick, but there are reasons to believe that notwithstanding the severe cold to which the ticks were subjected that it had not been acting for a sufficient length of time; indeed, under the conditions of the high veld it is probably not the sudden influence of the extreme cold, but the combined effect of a low temperature during the night followed by the warmth of the sun in the daytime.

Since, however, these experiments are more of a theoretical than of a practical value, I do not intend to carry them out any further unless the material necessary for this experiment can be utilized at the same time for experiments having more vital points at issue.

Reviews.

RESTRAINT OF DOMESTIC ANIMALS. By George R. White, M.D., D.V.S., Nashville, Tenn. 302 pp., with 338 illustrations. Published by the author. Price $3.75, post free.

Many works on horses and horsemanship, as well as those treating the management of the other domesticated animals, contain a consideration of some of the means adopted to control these animals for various purposes. It is usual to find in books on veterinary surgery also some account of the methods of restraint likely to be of service during the performance of operations, and after to prevent the patient from biting, rubbing, or otherwise injuring the part. We believe, however, that Dr. White's is the only work dealing systematically with the restraint of the horse, ox, dog, and pig. It contains over 300 pages, and a large number of illustrations. The subject is, on the whole, well considered, and most of the illustrations are good.

Fig. 104, however, which illustrates improved English hobbles, shows the chain passing in the wrong direction through the "D's" of hobbles "f" and "i," and in fig. 105 the same applies to hobble "b." In the description of the mode of application of these hobbles, reference is not made as to the direction in which the chain should pass through the "D's". This is a serious omission, for if the chain passes in the manner shown in the figures above mentioned, there is a great tendency for the chain to lock and interfere with satisfactory casting.

Several methods of casting horses with ropes are described, but we find no mention of the common method of averting the danger of the neck loop becoming displaced in the course of the animal's struggles when cast—viz., by tying the neck loop back to a surcingle, or a rope passed around the body.

The book will be found extremely useful both by students and practitioners; but we think the price is rather too high, $3.75 (between 15s. and 16s.), being more than most people will be disposed to pay.

STABLE MANAGEMENT AND EXERCISE. By Captain M. H. Hayes, F.R.C.V.S. Second edition, revised and enlarged. 8vo., pp. xvi. + 455, with 62 illustrations. (London: Messrs. Hurst and Blackett.)

The second edition of this work, which was published in 1900, has now been revised and enlarged by Colonel Steel, F.R.C.V.S., late of the Army Veterinary Service.

A useful service will not be fulfilled by our giving a detailed list of the many subjects considered; we will, therefore, content ourselves by broadly indicating the lines on which the book has been written.

The author's object in producing this volume was to meet a want experienced by veterinary students, and those horse-owners who are disposed to regard their horses as living things and not mere machines. Chapters are devoted to the theory of exercise and work, watering, feeding, stables, bedding, necessity and objects of clothing, management on board ship, summering hunters, wintering polo-ponies, &c., &c. In order to treat the various subjects from a modern stand-

point, anatomy, physiology, chemistry and other sciences have been invoked as necessary elements for a thorough consideration as to the way in which the subject of our care is constituted, his health maintained, and his energies appropriately fostered according to his needs under a great variety of circumstances.

An improvement on previous editions has been introduced into the present one in the form of a series of notes, in conspicuous black type, which obviate the necessity of reading through pages of matter when one desires to refer to a given point.

The work should prove very useful to veterinary students who are studying stable-management and hygiene, and it cannot fail to entertain all interested in horse-flesh.

The letterpress and illustrations are excellent, and the whole book well up to the publishers' high standard.—M. J.

Translations and Extracts.

HOVEN DUE TO TUBERCULOSIS OF A MEDIASTINAL GLAND.

BY DR. GOLDBERGER-KROJANKE.

Case 1.—On April 6 I was called to a cow belonging to Herr H., of D.

History.—The cow had been blown for some time, and the last few days this had occurred daily. Though the probang had been passed twice daily for a time, and the diet been restricted, there was no improvement. The two days previous to my seeing her the cow had taken little nourishment, but still the tympanites continued. She stood most of the time with an arched back. Rumination and eructation were in abeyance.

Present State.—On entering the cowhouse I found her lying; head up, bright look; on rising the back was immediately arched; rumen tympanitic; heart-beats free and plain; lung sounds normal on both sides. Pulse and temperature at the rectum normal.

Diagnosis.—Indigestion.

Therapy.—Hydrochloric acid.

On April 9 Herr H. sent me word that the cow had been slaughtered, and asked me to come at once and inspect the carcase. On my arrival I learnt that during life the gases had still formed in spite of the little food taken and the medicine given. The animal continued to preserve the "fiddle-bow" position. The owner got tired of this and ordered her slaughter.

Autopsy.—Examination of the abdominal organs showed nothing abnormal. The rumen was distended with gases almost free from smell, and contained watery masses of food. On taking out the organs of the chest I noticed the following: Between the two wings of the lungs there was a long tumour-like body, which the butcher who slaughtered her called "a second dead heart." This will give some idea of the form and size of this structure; it was about 9 in. long and 5 in. in diameter. The body proved to be an enormous

tubercle, which had attained this size through degeneration of the mediastinal gland. It contained coarse-grained, small caseations, and was traversed by a network of trabeculæ. The remaining glands of the lungs were tuberculous, but not much enlarged. The glands of the throat and all the remaining glands of the body were normal.

It may be taken that the tubercle developed to this great size in the later days, and pressed on the œsophagus running beneath, so that eructation of gases was hindered and a permanent tympanites arose.

CASE 2.—On July 21, three months afterwards, I had the opportunity of meeting with a similar case. Farmer J., of B., sold to a butcher here a fat cow, aged 5, of the Dutch breed, because she frequently got "blown." Inspection of the carcase showed great tuberculous enlargement of the mediastinal gland. This was about 5 in. long and about 6 in. in diameter. Other glands of the lungs tuberculous; no changes in the parenchyma of the lungs. In the left pharyngeal gland a small nodule; all the other glands and organs of the animal normal.

In this case also the tympanites arose through pressure of the greatly enlarged mediastinal gland on the œsophagus, which caused non-escape of the gas. A duplicity of cases!—G. M.

(*Berliner Thierärztliche Wochenschrift.*)

TUBERCULOUS LESIONS IN THE TRACHEA OF BOVINES.

BY A. CHRETIEN HEALTH VETERINARIAN.

TUBERCULOUS lesions in the trachea of cattle are relatively frequent. They occur as isolated or confluent ulcerations, involving the mucous membrane of that organ. These ulcerations are the final stage of tubercles that develop in the thickness of the mucosa. The nodules rapidly undergo caseation, soften, and open into the interior of the teachea, producing ulcerous surfaces, sometimes spreading, and exceptionally cicatrizing.

Their situation is variable. They are found most frequently in the neighbourhood of the larynx, where the submucous lymphatic vessels are very abundant. They are met with in the connective fibrous tissue comprised in the sides of the triangle formed by the two cartilaginous crests of the trachea and Reissessen's muscle.

Microscopically they present the form of little nodules, from the size of a grain of millet seed to that of a pea. They degenerate and form small abscesses, which contain pus, well formed, with whitish colour and creamy consistency. Frequently these lesions are situated in the middle part of the trachea at an equal distance from the larynx and the bifurcation of the bronchi. Animals exhibiting these nodules are always affected with tuberculosis of the lungs and their glands. We have encountered these lesions fifty-one times in autopsies of 268 tuberculous bovines, which is about 1 in 5.

Microscopic examination of the contents of the abscess for Koch's bacillus has always been negative.

Inoculation experiments reveal the bacilli. The lesions seen in sections

of the trachea are lymphoid infiltration and glandular infiltration, and the nodules exhibit a fibrous aspect.

Infection is probably by way of the lymphatics. Ulcerations of the trachea seen to be produced by direct penetration of bacilli mixed with bronchial mucus.—G. M.

(*L'Hygiène de la Viande et du Lait*).

CONTRIBUTION TO THE STUDY OF VARIOLA IN SWINE.

BY PROFESSOR C. MOTAS.

VARIOLA of the pig has been known for some time. Viborg, Gasparin, Pozzi, Virtgen, and others described it at the commencement of the nineteenth century as being an affection peculiar to swine, contagious, and easily transmissible (Viborg and Hering). Röll, Friedberger, and Fröhner mention it.

S. Dodd in 1906 described it in the Transvaal as being due to a spirochæte found in the cutaneous ulcers, and even in the blood. About this time also Szanto described it in Hungary. In our country it has been known for some time, and sometimes centres of infection arise giving rise to a grave enzootic.

The symptoms are varied according to the form of the illness, which is of two types: a form with a severe acute evolution, and another with a benign abortive evolution. In the severe form there is high fever, temperature 40·2° C. to 41·3° C., appetite gone, prostration, and insensibility towards the end of the illness. In certain places the skin is raised into rounded, hard nodules. In others the pustules are as big as a five-centime piece, the edges are hard, pale, and surrounded by a congestive zone; the centre of the pustule is depressed, and the colour yellow. Under the abdomen and where there is least pigmented skin there are eruptions in different stages of progress, from simple little miliary congestion to the finishing stage. In some animals the eruption may extend all over the body. Crusts form, and purulent matter collects under the scabs. Where the eruption is generalized and confluent, the skin is tumefied and wrinkled.

In the benign form pustules are rarer and smaller. In some animals there are no pustules; the skin is livid, dry, and clean. There may be diarrhœa and stiffness, falling away in condition. Duration of malady ten to twenty days. In one outbreak, out of 630 pigs 275 died.

Lesions.—Simple congestion followed by skin infiltration, forming a lump, surrounded by a congestive zone. The centre of the swelling becomes moist and yellowish. The skin softens and yellowish matter is discharged, which dries on contact with air, becomes reddish-brown and adherent to the adjacent parts. It is hard to see the pits in the skin when the scab falls. The glands are enlarged and congested. The lungs in certain animals present foci of broncho-pneumonia. The liver is congested; the spleen often hypertrophied and blackish. On the mucosa of the cæcum necrotic lesions of solitary follicles may be present. They are of different sizes, and numerous enough in the region of the ileo-coccal valves.

Five experimental inoculations gave negative results, and co-habitation experiments were the same. The illness cannot be transmitted by vaccination, and is difficult to transmit experimentally. It is hard to explain why this is when animals are kept under natural conditions of contamination. None of the spirilla seen by Dodd were found.

(*Arrhiva Veterinara.*)

ARMY VETERINARY SURGEONS AND ARMY HORSES.

BY M. PAUL GOLDBECK.

Belgium.

Personnel.—A chief veterinary surgeon who is a lieutenant-colonel; four veterinary principals who are majors; ten regimental veterinary surgeons of the rank of captain, commanding; five veterinary surgeons of the first class, captains; eight veterinary surgeons of the second class, lieutenants; seven of the third class, sub-lieutenants; six assistants, sub-lieutenants.

The Belgian Army possesses 7,300 horses; about 162 to each veterinary surgeon.

Denmark.

The veterinary service is autonomous. It is directed by a chief veterinary surgeon, lieutenant-colonel. It is directly responsible, and in direct connection with the Minister of War.

The list of officers comprises five veterinary captains, four veterinary lieutenants, and four veterinary sub-lieutenants of the reserve.

Denmark has 2,300 military horses.

Spain.

Spain possesses 166 army veterinary surgeons, and has 17,153 horses. One veterinary surgeon to each 103 horses. The *personnel* comprises one principal veterinary surgeon of the first class who is a colonel; four principal veterinary inspectors of the second class, lieutenant-colonels; ten veterinary majors, majors; sixty-nine veterinary surgeons of the first class, captains; seventy-one veterinary surgeons of the second class, lieutenants; eleven veterinary surgeons of the third class, sub-lieutenants.

Veterinary students obtain the diploma after a forty months' course at a veterinary school. Veterinary surgeons under the age of 30 are admitted to compete for the rank of third class veterinary surgeon.

The veterinary colonel, assisted by a veterinary major, rules and acts in general administrative matters in connection with studs and remounts. The four veterinary lieutenant-colonels have different duties. One of them is attached to the sanitary section of the Minister of War, he is the head of the veterinary *personnel* office; a veterinary captain is assigned to him. The second lieutenant-colonel is on the army staff; a third is a member of the military instruction bureau; the fourth is director of the first army corps. Seven veterinary majors are directors of the veterinary service of an army corps.

The veterinary military institute of hygiene and the military studs are directed by a veterinary major who is seconded by veterinary captains and lieutenants. Other veterinary officers are thus apportioned: Regiments: one captain and one lieutenant. Remount depôts: one captain, one lieutenant, and one sub-lieutenant. Stallion depôts: one lieutenant. School of farriery: one captain and one lieutenant. Remount commissions comprise one veterinary captain and one veterinary lieutenant.

Greece.

Two thousand horses, twenty-seven veterinary officers, seventy-four horses to each veterinary surgeon. The list of officers comprises one lieutenant-colonel-director, inspector-general of veterinary military service; one major, director of the farriery school and of the garrison hospital at Athens; nine captains, of whom three are directors of the army service corps; seven lieutenants, and five sub-lieutenants.

Italy.

Effective force, 37,243 horses (year 1904); 178 veterinary surgeons; 209 horses to each veterinary surgeon.

Personnel.—One veterinary colonel, director of the veterinary service to the Minister of War; four lieutenant-colonels, directors of the most important army service corps; twelve majors, eight directors of the army service corps, one attached to the colonel, one director of the military bacteriological cabinet (under the disposition of the Minister of War), one to the cavalry school, and one to the school of farriery at Modane; seventy-five captains, and eighty lieutenants and sub-lieutenants.

At the ministry of war (general secretariat) is a veterinary colonel, head of the veterinary inspection office, assisted by a veterinary lieutenant-colonel or major. The civil employees are: A secretary, a keeper of the records, and an ordainer. The veterinary colonel is directly under the Secretary of State. He occupies himself with general questions concerning hygiene, hippotechny, sanitary police, and veterinary jurisprudence. He concurs in modifications of rules and instructions in the veterinary service. He is expected to know and control the technical and scientific value of veterinary officers, and their aptitude for special services. He regulates the execution of different matters concerning the preservation of animals, and puts in force those he considers useful. He presides at the commission for the advancement of veterinary officers. He corresponds directly with the chiefs of the army service corps. He presides over and has under his direction a bacteriological cabinet, which has for its object the experimental study of infectious diseases, and the study of serums and vaccines, the examination of pathological products, and the distribution to the veterinary officers of practical means of study in micrography and bacteriology, The Italian veterinary military service possesses a director provided with wide powers and attributes not only as regards centralization of technical matters, but also affecting *personnel.* He is in direct communication with his assigned directors of the service in each army corps.—G. M.

(*Le Bulletin Vétérinaire.*)

ABORTION IN THE CHIEF STUD AT BEBERBECK IN 1908.

BY E. MIECKLEY.

In the year 1908 there was considerable abortion in this stud. Out of sixty-four foals only twenty-five were born healthy and alive. All the others were cast before their time, or if born alive soon succumbed. Between February 7 and 12 it was very noticeable that eight in-foal mares were suffering from sacral paralysis affecting sensorium prejudicially; appetite bad, the visible mucous membranes of the head and vagina coloured yellow, temperature subnormal. Of these affected mares two aborted on the sixth, one on the fifth, and one on the eighth day of illness. The remaining four mares brought forth healthy and still living foals. Two non-pregnant mares showed at the same time the same symptoms of paralysis.

Post-mortem.—Always gave the same result. The fœtal placenta at the chorion was more or less œdematous and very clear in colour. The fœtus was yellow all over, and serous and bloody effusions in the thorax and abdomen as well as in the pericardium. In the hygiene institute at Hanover no organisms but coli-bacteria could be found. The abortion bacillus of Bang or Ostertag could not be found. Infection experiments with pieces of the after-birth failed. Mieckley considers this was an intoxication abortion. The symptoms of illness pointed to it, and rabbits fed on the Beberbeck fodder aborted.

(*Deutsche Tierärztliche Wochenschrift.*)

Books and Periodicals, &c., Received.

Surrey Advertiser; Journal of the Royal Army Medical Corps; Tropical Agriculturist; Agricultural Journal of the Cape of Good Hope; Journal of the Royal Society of Medicine; Bulletin of the Bureau of Sleeping Sickness.

Letters and Communications, &c.

Professor J. J. O'Connor; Mr. G. Sutton; Mr. L. M. Douglas; Department of Agriculture and Technical Instruction for Ireland; Board of Agriculture and Fisheries; The *Lancet*.

NOTE.—All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

Letters for the JOURNAL, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements), should be addressed to the Editors.

Manuscript—preferably type-written—should be on one side only of paper, marked with full name of author.

Illustrations for reproduction should be in good black or dark brown on white paper or card.

Advertisements and all business matters relating to the JOURNAL should be addressed to the publishers, Messrs. Baillière, Tindall and Cox.

MR. J. D. STEWART, M.R.C.V.S.,
First Professor of Veterinary Science at Sydney University.